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College of Architecture and Planning

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Graduation project report
Khartoum Creativity and Mind building institute.

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Abstract

The project aims to promote the vision of the youth and adults about the marginalized part of education creativity, innovation and practice and to help them facilitate the creativity process and create new possibilities for exploration and expression.

The project consist of educational section that's sub divided into art engineering human development. Where the students starts exploring these parts in a new entertaining way. Also it consist of sports area , exhibitions which shows some of the outcomes the students achieve. Research area consist of innovation labs where students can start bringing things together to form new outcomes to the society.

And there are entertainment spaces such as the auditorium, interactive exhibitions, library and the administrative zone



المخلص:

يهدف المشروع الي تعزيز رؤية الشباب و الكبار عن الجزاء المهمش من الابداع و الابتكار و الممارسة التعليمية و مساعدتهم علي تسهيل عملية الابداع و خلق امكانيات جديدة للاستكشاف و التعبير

و يتالف المشروع من قسم تعليمي ينقسم الي الفن و الهندسة و التنمية البشريه .حيث يبدا الطلاب استكشاف هذه الاجزاء بطريقه مسليه جديدة. كما ان المشروع يتكون من منطقة رياضة, معارض التي تظهر بعض الابداعات التي يحققها الطلاب. تتكون منطقة البحث من مختبرات الابتكار حيث يمكن للطلاب البدء في جمع افكار لتشكيل نتائج جديده للمجتمع. و هناك معارض تفاعليه و مكتبه و خدمات و المنطقه الادارية.



Dedication

To the souls that bought me into this world.

To my little leen & Aseel ..

To my ideals Reem & Azza ...

**To my dear friends without exclusion (ohood, esra, eman azhari,
eman omar, toga, tayser, yasmin, razan, wafa, leena, radwa,
alaa, hind, malaz, amna, sahar muktar , maha, Khadija, yousra,
ibtihal, Fatima, muram, hiba)**

**And to every person that struggled to find their way through our
tough educational routine**





Acknowledgement

I would first like to Praise and thank Allah for giving me this opportunity to gain knowledge . I present my thanks and gratitude to my supervisor Dr. Awaad saad for all the help he has given me and all the teachers who helped in reshaping my mind as an architect and as a human being.





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Chapter one

Introduction:

1.1 Definition:

Its an institute that promotes the vision of the youth and adults about the marginalized part of education creativity, innovation and practice.

1.2 The purpose of the project:

- a. To advance in science, art, technology, engineering & religion.**
- b. To facilitate the creativity process from imagination to innovation, to create new possibilities for exploration and expression.**
- c. To draw a pathway between research, artistic output, scientific and educational innovation.**
- d. To prepare primary, secondary and undergraduates to work and succeed in a world where science, technology, engineering and art collaborate**
- e. To encourage people of all age to discover their abilities and talents.**

1.3 The importance of the project

a. Regionally:

The society needs to discover the talents and creativity in them to help in its advancement and renaissance, through developing and encouraging creativity and talents.

b. Socially:

To help individuals to discover their abilities and talents and to install the sense of confidence in them through developing them so that these individuals will help in production and advancement of the society





1.4 The goals of the Project:

- a. **The education system that effects the minds of the curious kids into a dull typical minds which has a negative consequences on the society like :**
 - **Typical solutions for problems**
 - **Suppression of the abilities which could cause mental and emotional problems for individuals that are not able to find themselves in the dull educational system.**
- b. **Creating a highly creative, innovative and mind building environment**
- c. **To adopt the idea of integrating creative and innovative minds to produce solutions for following what they are passionate about**
- d. **To create an atmosphere for collaborations**

1.5 The reasons for choosing the Project:

- a. **Schools curriculums depends on the accumulation of information which is far from creativity and mind building which connects education with dullness & absence of fun**
- b. **The deterioration of education which distance the youth from the current development in scientific, artistic, mathematical fields (technology)**
- c. **Failure in providing facilities that serves ages (5-20) for the development of creativity, innovation and mind.**

1.6 The Projects Aspects :

- a. **Functional aspects:**





To assimilate the primary function of the project.

b. Structural aspects:

To use a structural system that allows freedom in formation (architectural profile) and reduce the complexity of the building

c. Economical aspects:

Providing chances for employment in the country. To benefit from the renewable and inexhaustible services to adopt and limit energy consumption.

d. Aesthetic aspect:

To create a creative form of a building that allows the user to speculate, to create a fertile environment for creativity, innovation and thinking.





Chapter two

literature review

(General and special information)

2.1 What is creativity, innovation and mind building?

Creativity is the act of turning new and imaginative ideas into reality. Creativity is characterized by the ability to perceive the world in new ways to find hidden patterns to make connections between seemingly unrelated phenomena and to generate solutions. It's the mental characteristics that allows a person to think outside the box, which results in innovation or different approaches to particular task.



Innovation involves deliberate application of information, imagination and initiative in deriving greater or different values from resources, and includes all processes by which new ideas are generated and converted into useful products.

Mind building is to develop student's critical thinking skills. Each activity promotes problem-solving, logic, and observation skills that prepare students for higher level of studies. Students are actively encouraged to verbalize their thinking to aid comprehension and to aid comprehension and to reinforce concepts and skills.

2.2 The culture:

the integrated pattern of human knowledge, belief, and behavior that depends upon the capacity for learning and transmitting knowledge to succeeding generations.





Culture in a comprehensive sense: It is all the theoretical and practical information that allows us to identify ourselves and others. It includes all material, forms of behavior, morals, ways of thinking, and the total experience gained during the time period

The concept of culture in philosophy Definition of culture The most accurate philosophical definitions of culture in modern times are described as the dialectical relationship between knowledge, arts, religions, laws, ethics and habits acquired by man from society, and is based on two basic factors: the individual within the larger group that constitutes the society, the combination of material and moral knowledge ; In addition to the knowledge that man receives in theory, the experiences are considered the basic components of culture.

2.3 Importance of culture:

1 - Culture expands the perception of people, so that the intellectual more understanding than others, and more able to absorb the circumstances around him and understand the reality surrounding it. Culture promotes the positive energy of people so that the abundance of reading and reading make the person more optimistic and more positive.

2 - The culture increases the ability to make decision, especially the right decision, because the knowledge of the cultures of others and the abundance of reading in the affairs of management and management increases these successes in decisions.

3 - Culture eliminates leisure time by engaging in the request to know or look at the knowledge of others, either through books or through participation in cultural dialogues that benefit the intellectuals greatly, because it opens a wide door of knowledge.



4 - The culture of its owner in reaching solutions faster than others, thanks to the experiences gained during his cultural career.

5. Culture A person gains the respect of others and makes him a home to warn those who seek refuge in the Nile by virtue of his knowledge of the affairs of life and the prevailing laws.

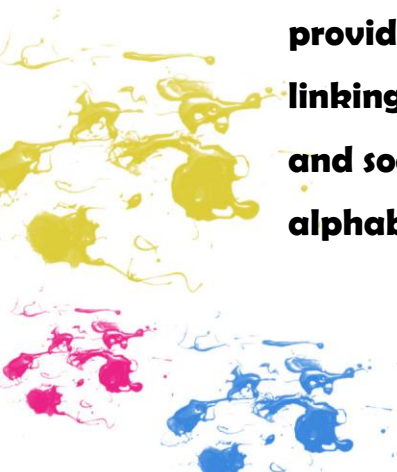
6. A society characterized by a high culture is far from being penetrated by those who hold extremist and absurd ideas. Culture is considered a wall against intellectual or cultural invasion because of the existence of a cultural culture.



7 - Culture protects society from the existence of qualities that do not respect others and do not accept their presence, because culture means respect for others and look at them with a neutral view away from hatred and hatred, you reach the perception through your vast culture that each person his own nature and his own opinion.

2.4 History of youth centers in Sudan:

Society Studies Center (SSC) - By Center for Community Studies (MDA)



This study is intended to show the vanguard role that youth centers can play in achieving national goals and the lofty objectives of youth work. The importance of the study is that it seeks to highlight the role that youth centers can play in this pivotal phase in which the Sudanese nation is passing. It can provide opportunities for training and capacity development, linking youth with the spirit of technology, fostering their cultural and social activities, and paying attention to the eradication of alphabetical and technical illiteracy.





The study mentioned that the youth centers went through several stages in which multiple names were taken. The first nucleus was the city of Bakht Reda, which was the first of the boys' clubs to absorb the educational losses. In 1967, the first girls' house was built but it did not last long. Al-Sejana Youth Center was one of the first clubs to be transformed into youth centers in 1968. After the Boys Club was transformed into a youth youth center, the youth centers project started with a preliminary study based on coordination between the Ministry of Youth and Sports, the International Labor Organization and the United Nations Development Program Signed Protective with these international organizations Tnassa the establishment of youth centers, social development, in which the state contributes to the local component of facilities and career staff while international organizations to provide the necessary funding, equipment and Brat.oukd reached the number of centers in various cities of Sudan (40) and a sub-major center.

The study pointed out that the aim of youth centers to achieve them is to achieve the leadership of youth and their leadership in order to complete the nation's civilization and development through the commitment of youth work in the framework of the youth centers to the principles of humanity in terms of communication and brotherhood, equality, justice, freedom and rights without discrimination between races and ethnicities, National and Shura Council as important principles for the work of youth in public affairs, planning and implementation at different levels of the structures of the youth centers, and the commitment of the scientific curricula to raise the level of capabilities and develop them from literacy to reaching the highest point Modern, and that young people Mnact youth and their programs are



committed to inclusiveness and integration and balance between the soul and mind requirements and material requirements, and raise the spirit of religion and faith I have the initiative in the good and righteous deeds, ages and special care needs in the community, such as displaced persons, the disabled and talented owners.

The study showed that the general policies of the youth centers can be highlighted according to the following axes: administrative management and coordination, social axis, external axis, culture and information axis, educational and educational axis, planning, monitoring, studies and training center, Institutions, organizations and bodies related to youth work, the Ministry of Youth and Sports Federal and State, youth associations, universities and information research centers) and this through festivals and conferences, various media and communication networks, Intellectual and cultural forums, and Dora

2.5 Creativity in sudan:

All countries have endeavored to stimulate the creativity and encourage them and create the conditions for them to develop their innovations and innovations in the fields and provide them with material and moral assistance. Khartoum is currently striving to keep abreast of progress in the field of creativity and amateur and professional and began to pay attention to this through some annual events and festivals. So I have found this idea logical and important in developing our country. At the level of Sudan there are several institutes and these institutes include a committee of



experts specialized in the fields of creativity and these committees are experts with a long time in each of his competence. Who have unique and unique ideas and innovations presented to the specialized committees that decide in turn the possibility of the creative affiliation to the Institute. If the committee agrees to this, the creator continues to develop his innovation within the institute to reach his final state. Examples similar to the institutes in Sudan are the Korean Institute and the Turkish Institute. The competent authority in Sudan The National Fund for the care of creators The annual appeal to me The National Fund for the care of creators 700 people annually

2.6 Case studies:


2.6.1 Case study 1



Figure 1- hardesty art center perspective

Name of the project : Hardesty art center.





Project description: It takes cues from the urban fabric of the area's rich history, the building's design is deeply rooted in the Brady Art's District in both its materiality and planning. The Hardesty arts centre employs the honest use of materials. Weathering steel, extensive glazing, exposed steel and concrete are in keeping with the industrial aesthetic that defines the district.

The ground floor of the facility both literally and figuratively opens to the community through a series of operable glazed panels allowing pedestrians to flow into the facility from the street- becoming immersed in the activities within the exhibit spaces. The educational components of the centre's programs are veiled with a perforated weathering steel panel. The treatment of this element was designed so that the pedestrian would have a glimpse of activities within, thus being intrigued and drawn in to participate. The centre incorporates many modern sustainable design elements while respecting the Brady District's historic industrial aesthetic.

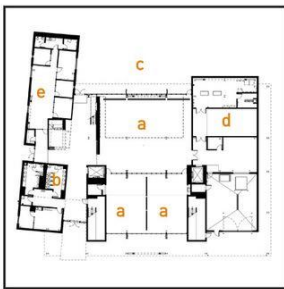
Project aim: The primary aim of the project is to engage the community in the arts

Studio designer: Selser Schaefer.

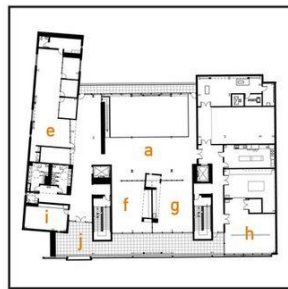




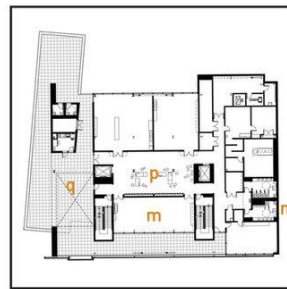
- | | | |
|---------------------|---------------------|-------------------------|
| a. Gallery | h. Wood Shop | o. Photography Lab |
| b. Gift Shop | i. Conference Room | p. Collaborative Spaces |
| c. Sculpture Garden | j. Terrace | q. Outdoor Event Space |
| d. Exhibit Prep | k. 4D Studio | r. Creative Studio |
| e. Offices | l. 3D Studio | s. Outdoor Studio Space |
| f. Library | m. 2D Studio | t. Green Roof |
| g. Kid's Studio | n. Digital Arts Lab | |



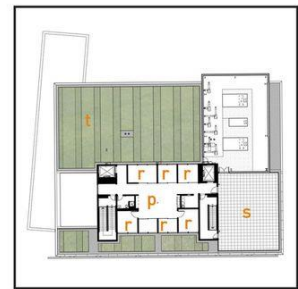
1.



2.



3.



4.

Figure 2- plans of hardesy art center

Areas of the site: 43.000 m2

Components of the project:

- 1. Gift shop**
- 2. Exhibit prep**
- 3. Library**
- 4. Kid's studio**
- 5. Conference room**
- 6. Terrace**
- 7. Digital art lab**
- 8. Photography lab**
- 9. Collaborative spaces**
- 10. Creative studios**
- 11. Sculpture green**





12. Outdoor events space

13. Outdoor studio space

14. Green Roof

15. Offices

16. Toilets

17. 3d studios

18. 2d studios

19. 4d studios

20. Galleries

21. Wood shops

22.

Advantages:

Separate services for students and admins

The orientation of the building is North west – south east (Depending on their climate

and the need for natural light for than ventilation)

The sculpture garden is a artificial view for the studios that are glazed in these directions

Using green roofs as a sustainable figure in the building

Disadvantages:

The main entrance is not clear ..

The entrance is for Administrators and students

To reach the educational and exhibition areas in the ground floor you have to pass through the administration zone

You have to go through the collaboration areas to reach the back studios





Have to go through the galleries to reach the preparation rooms or go outside the building to reach from the back doors no access from the inside

2.6.2 Case study: 2



Figure 3- Abudhabi science center

Name of the project : Abudhabi science center

Project description: The center introduces a complete program to teach science outside the school frame through huge exciting program from scientific exhibitions to simulating the universe in a 12 diameter

Project aim: The primary aim of the project is to engage the community in the arts

Studio designer:

Areas of the site:6500 m2

Components of the project:

- 1. Main lobby**
- 2. Land,sea,air exhibition**





- 3. **Natural resources exhibition**
- 4. **Mechanics exhibition**
- 5. **Sensation exhibition**
- 6. **Manufacturing exhibition**

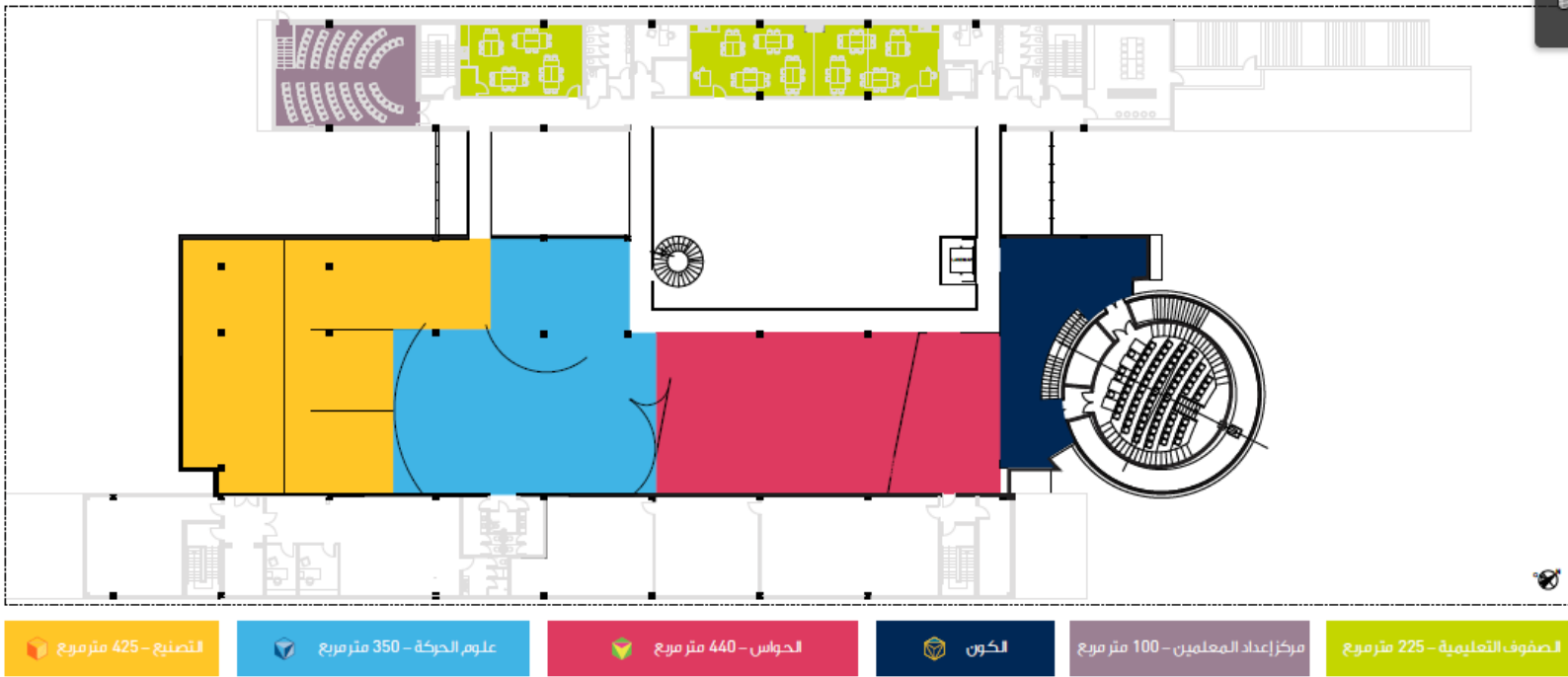
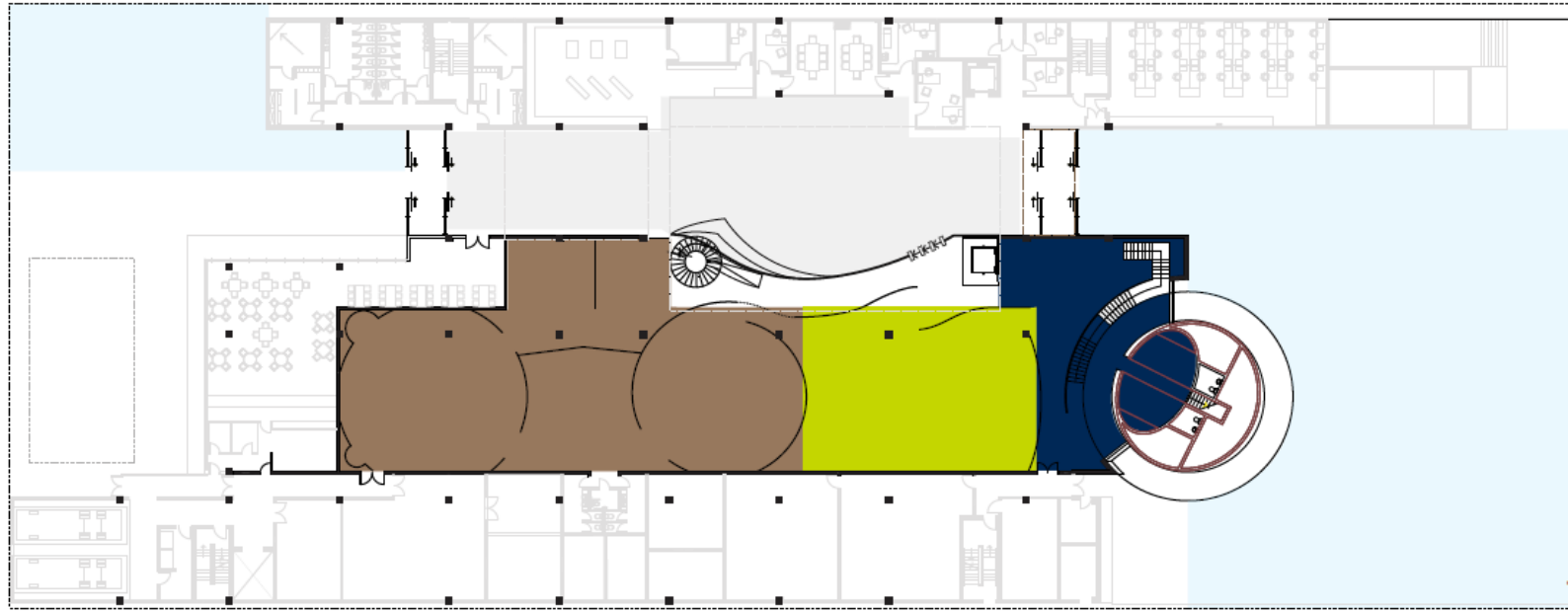


Figure 4- abudhabi science center ground floor





الموارد الطبيعية - 592 متر مربع	البر والبحر والجو - 260 متر مربع	الكون - 610 متر مربع	قاعة الاستقبال - 350 متر مربع	المعرضات الخارجية
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Advantages:

Teachers preparation workshops

Classrooms are close to the offices

Services are close to the exhibitions

The interactive models idea to attract the attention of the children to be great innovators and creative individuals

Good ventilations for all the offices classrooms and workshops north south

Disadvantages:

Back to back spaces (exhibition with services)

Columns distribution interrupts the eyes view ...



Figure 5- abudhabi science center 1st floor





2.6.3 Case study 3

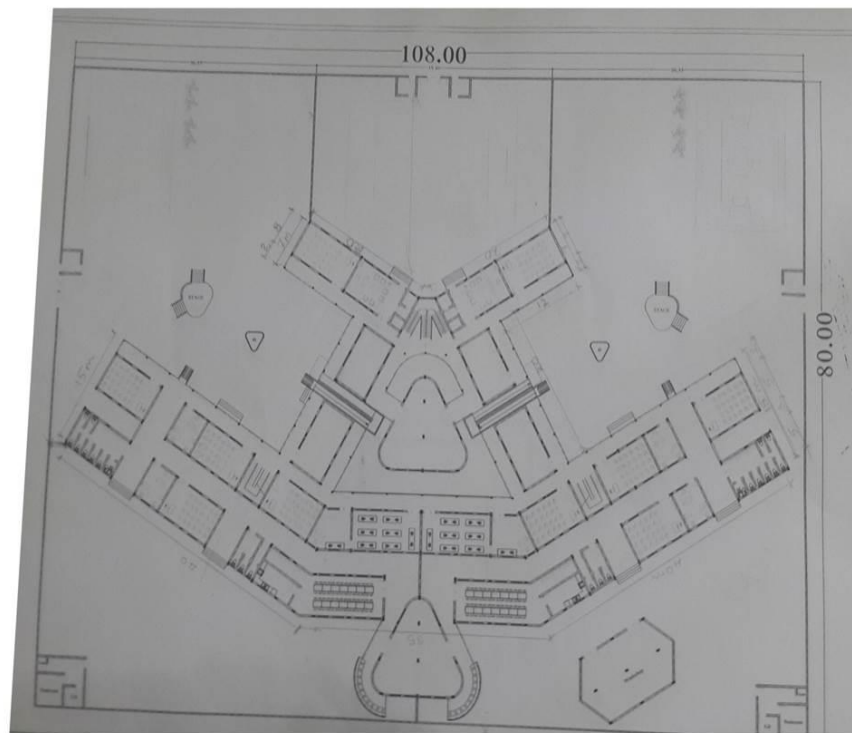


Figure 6- Al mwhobeen school round floor

Name of the project : Al mwhobeen international school

Project aim: To improve the skills of gifted students by providing intensive studies curriculum and providing equipments and tools that supports the process

Studio designer: Yosra Abdalla Farwa

Number of users: 250 students

Areas of the site: 8640 m²

Built area 3000 m²

Advantages:

The Library is central between the boys school and the girls school which would lessen the expenses of building to different libraries with same amount of books etc

Main stairs is near the main administration and visitors entrance





Ramps are good for the children's safety and special need children (every school has to put into consideration the needs of special needs because every school has to at least have 2% of them)

Good playground orientation (North)

Good Ventilation for classrooms and computer labs

Offices are distributed equally beside the class rooms which will provide good supervision

The entrance of the students is separate from the visitors and administrators entrance

The percentage between the built space and open space is good

Assembly area is good for performing morning activities and near the students entrance

Cafeteria is well ventilated and located in a suitable place

Human development section for teachers to let their skills cope with the needs of the children

Tress belts surrounding the school from southern side

The school is well secured from all sides 2 at the south 2 at the north a 1 in the east and western side.

Stairs between the classes is well centered

Disadvantages:

The workshop shape is odd when compared to the site and the building formation

Corridors at the back are unnecessary

Toilets has bad orientation (north east) which is the side of the prevailing wind

The distance from the main entrance of visitors and administrators to the reception is so far





Chapter three

Data Analysis

(functional + human = spatial)

3.1.1 Activity components.

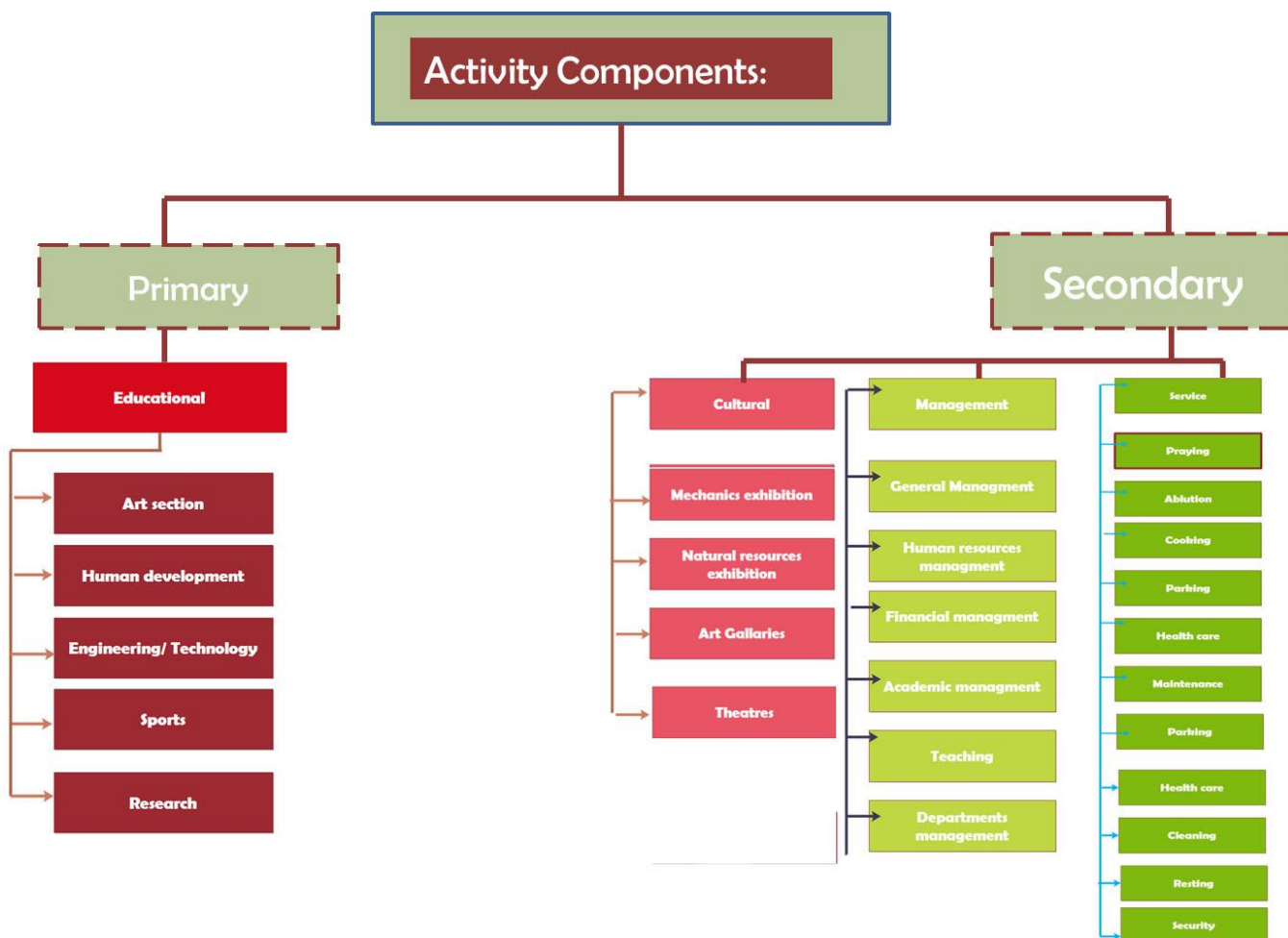


Figure 7- activity component



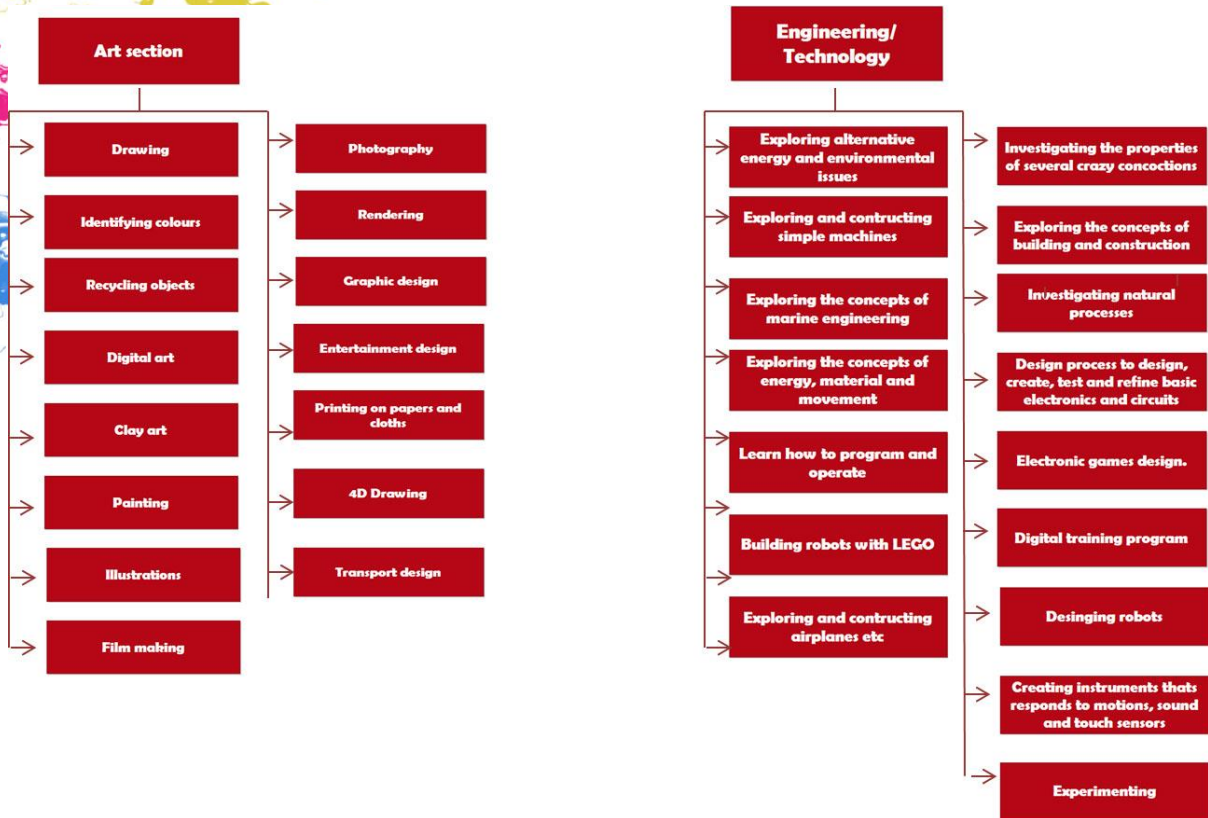


Figure 8- art and engineering sections

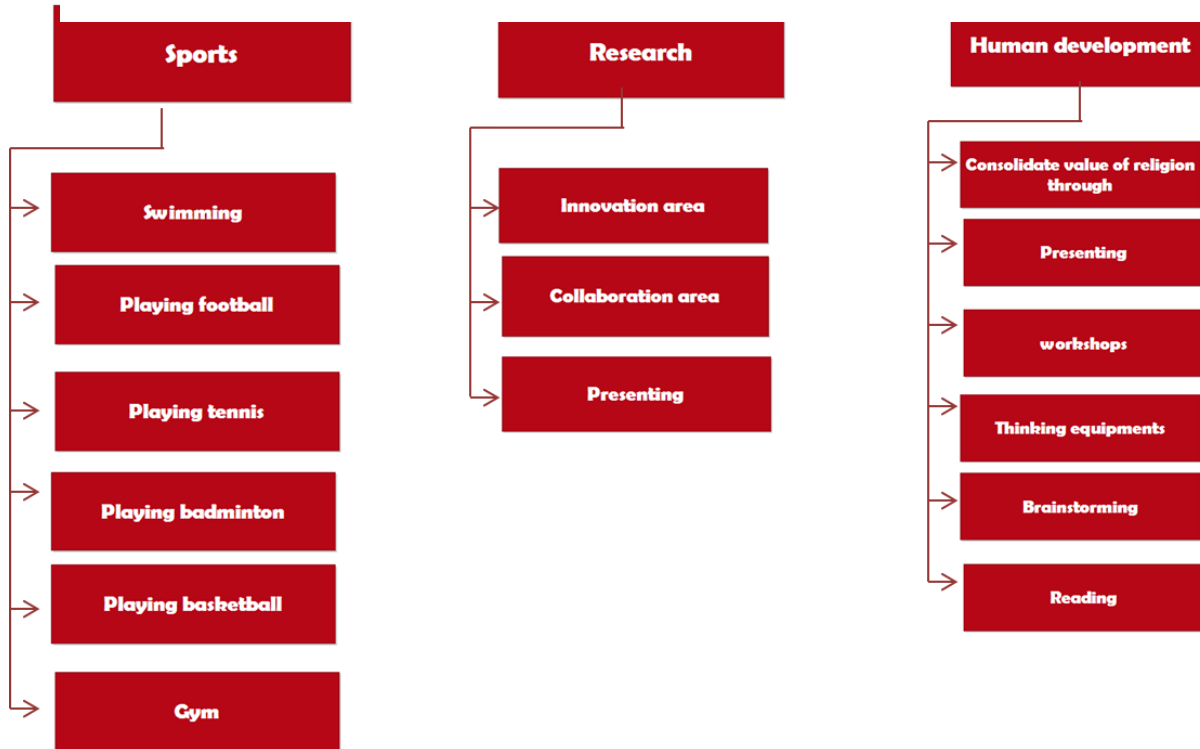


Figure 9- sports, research and human development section



3.1.2 Human components.

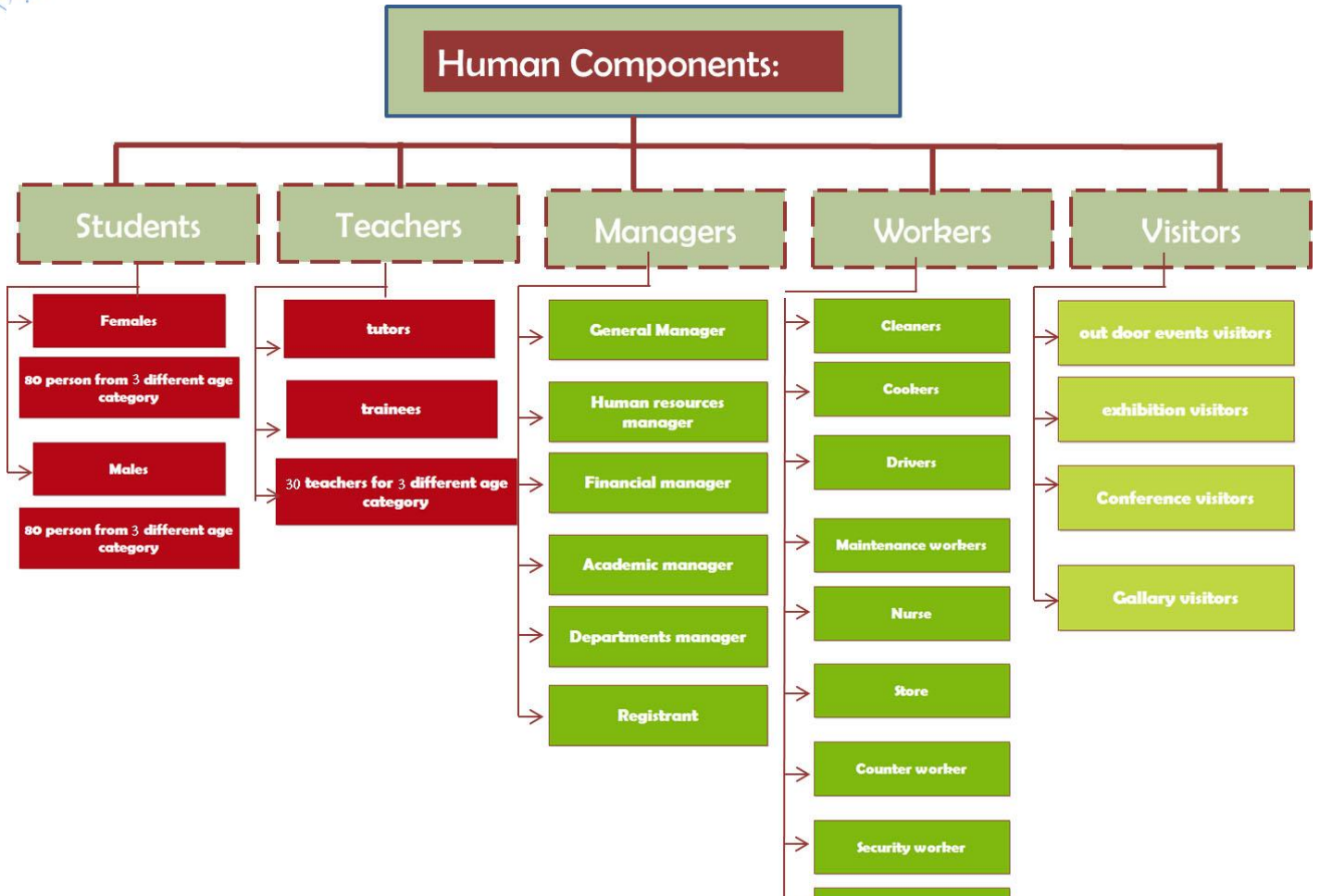


Figure 10



	Theatre	200	4-8	0.6	320	1	320
Management	General management office	4	8-2 4-6		25	1	25
	Human resources management office	4	8-2 4-6		25	4	100
	Financial management offices	4	8-2 4-6		25	2	50
	Academic management office	4	8-2 4-6		25	4	100
	Registration office	4	8-2 4-6		25	2	50
	Teachers offices	45	8-2 4-6		35	9	315
	Lobby	100	8-2 4-8		80	2	160
	Archive room				50	2	100
Service	Caferia	100	8-2 4-8		300	1	300
	Toilets		8-2 4-8		15	18	270
	Parkings	35	8-2 4-8		19	35	665
	Store rooms	10	8-2 4-8		25	5	125
	Prayer rooms	50	8-2 4-8		40	8	320



Table 1- activity chart

	Security room	2	8-2 4-8		40	1	40
	Maintenance room	2	8-2 4-8		40	2	80
	Health clinic	4	8-2 4-8		40	1	40
	Rest rooms	10	8-2 4-8	Chairs, tables, beds, lockers	40	8	320

Activity	Total Area of the activity	Floors divisions & Percentage of the area in each floor
Educational	17979 (120 %)	Ground floor – 7127 m ² – 47% 1 st floor – 3995 – 26.7% 2 nd floor – 3995 – 26.7% 3 rd floor – 1431 – 9.8% 4 rd floor – 1431 – 9.8%
Cultural	2363 (15.1%)	Ground floor – 1000 m ² – 6% 1 st floor - 1363 – 9.1%
Administrative	1525 (10.1)	Ground floor- 470 m ² _ 3.1% 1 st floor – 537.5 – 3.5% 2 nd floor – 537.3 – 3.5%
Service	3075 (20.6 %)	Ground floor – 450 m ² – 3% 1 st floor – 656 – 4.3 % 2 nd floor – 656 – 4.3 % 3 rd floor– 656 – 4.3 % 4 rd floor – 656 – 4.3 %
Total built area	24,942	14960 (60%)
Outdoor	9973	40%

3.2 Space study

Drawing Studios:

- In this space most ideas come to life, it's where students first ideas come to sketch, draft and draw their ideas.
- Working area for a single designer is 3.5-4.5 square meters.
- Circulation paths around the working area with a width of 1 m.
- natural lighting is preferred, and artificial lighting should be at 500 lx.

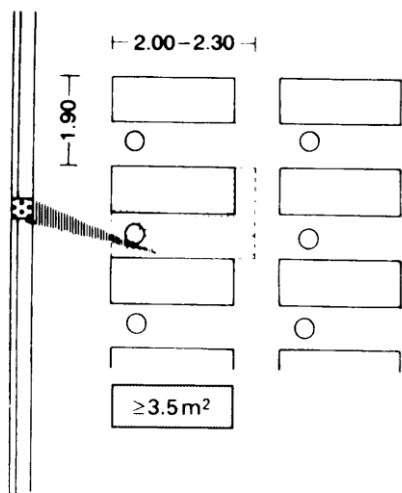


Figure 13 studio plan

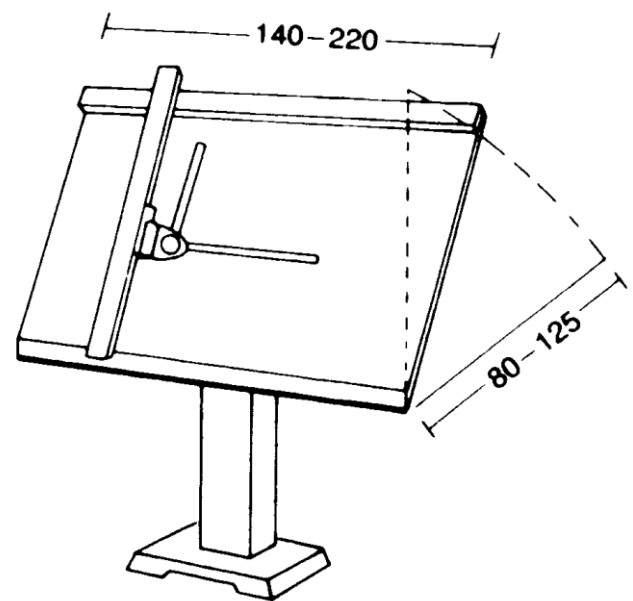


Figure 12- board dimensions

for kids under age 12

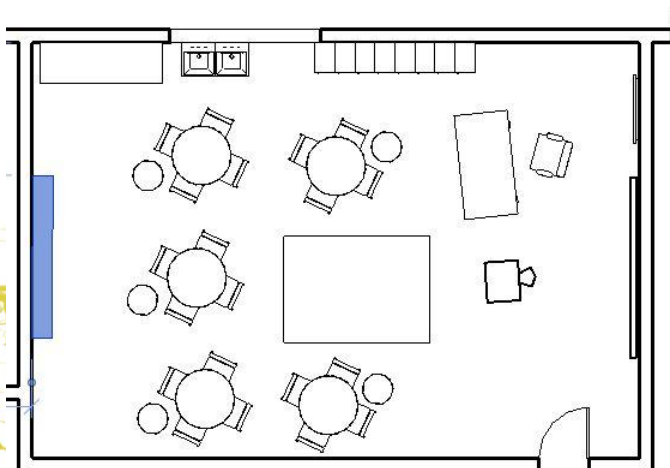


Figure 14 childrens drawing and painting class

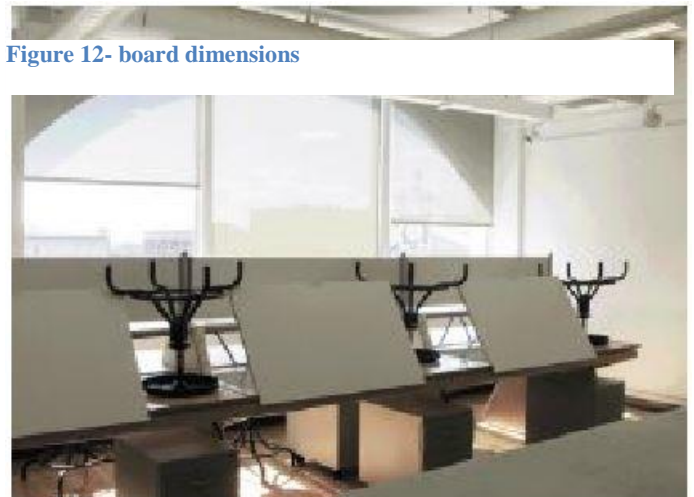


Figure 11 studio interior



General purpose seminar rooms:

- space required per student .90-2.00m².
- can be arranged in several ways.
- can take up to 60 seats.

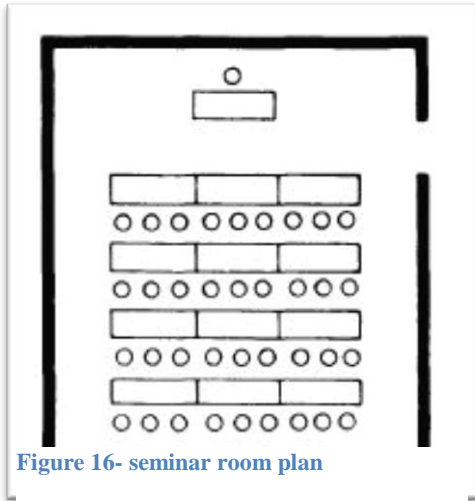


Figure 16- seminar room plan



Figure 15- seminar room interior

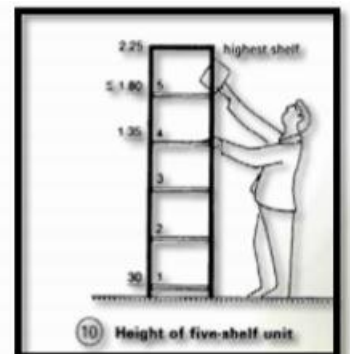
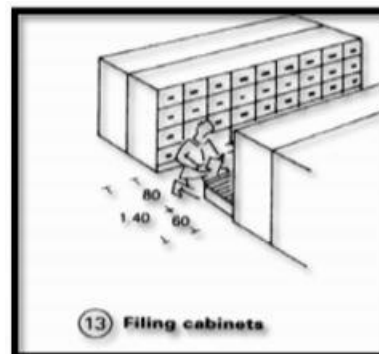
Library:

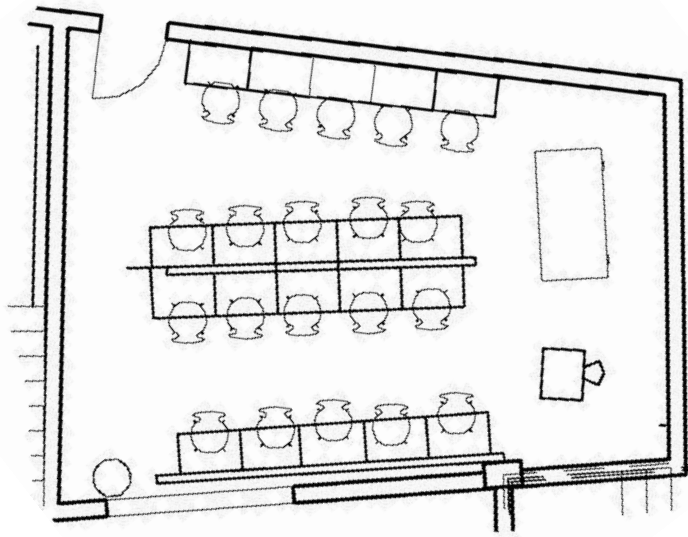
Consist of shelves , tables and chairs

Number of users = 200

Type of users: students , visitors

Figure 17 library shelf height and distribution





Area of a person : 0.8

Computer lab;

students use this space to get to know basics of computers, digital art software engineering labs etc .

- Number of users is 18 graphic designers. •
- Cabinets' area is 6 square meters, the circulation area around the cabinets is 9 square meters.
- 2m paths around the working area. •

Total area of the space is 40-50 square meters.



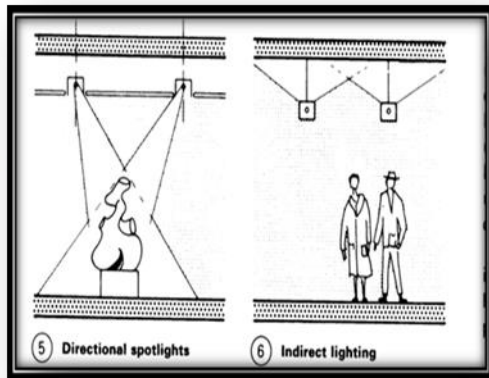


Figure 19- gallery light distribution

Gallery:

Viewing area: the distance between the displayed and the viewer and the number of viewers allowed either displayed.

- The distance between the displayed and the viewer: must achieve the appropriate distance to the comfortable vision that deliberately: 1 - field of vision of the eye
The natural vision angle of the person starts from zero to 54 degrees and from the eye 27 degrees above the level of view.

2 - high level of consideration: and determines the length of the person who is divided into three categories:
(Man-woman-child)

3 - The height of the painting of the display and the dimensions of the painting are inversely proportional to the distance.

* The height of the plate should not exceed 30 cm above the look level and not less than 90 cm below

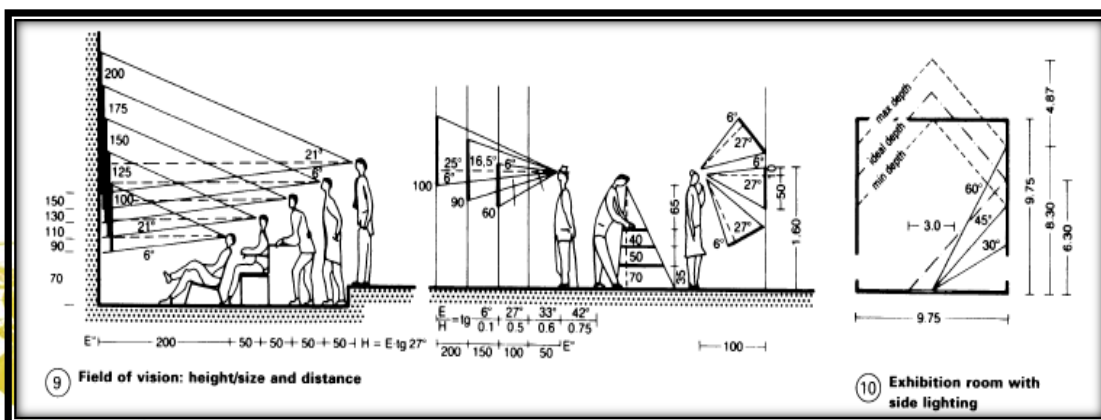


Figure 20- heights

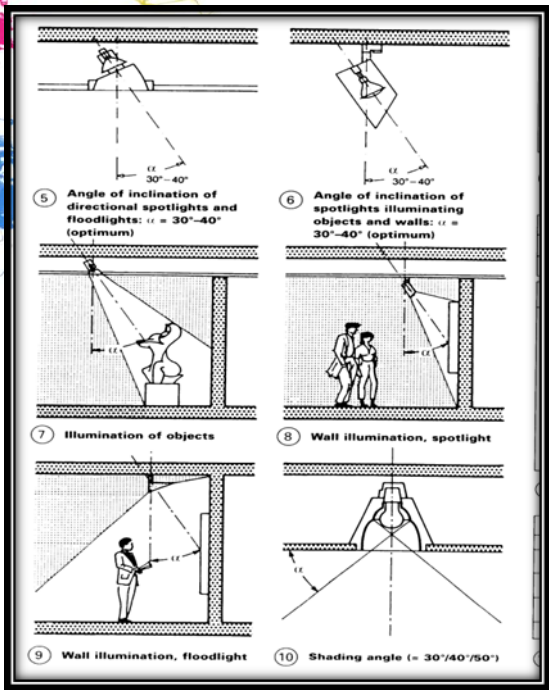
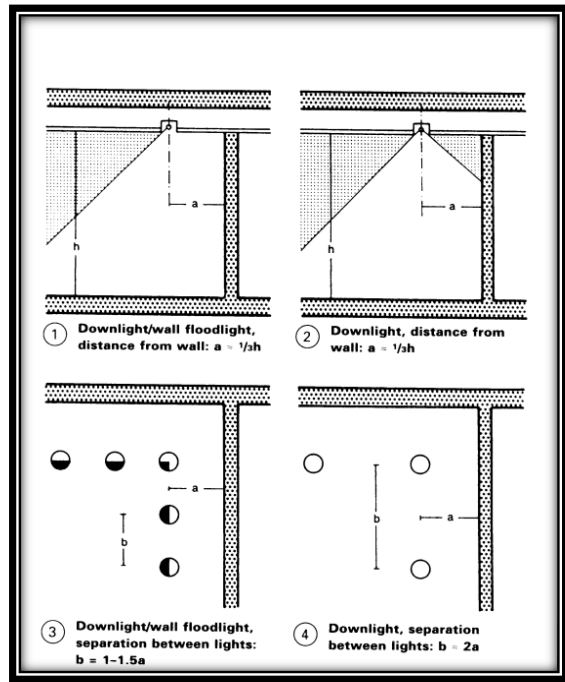


Figure 21- light position



3.4 Movement Scheme

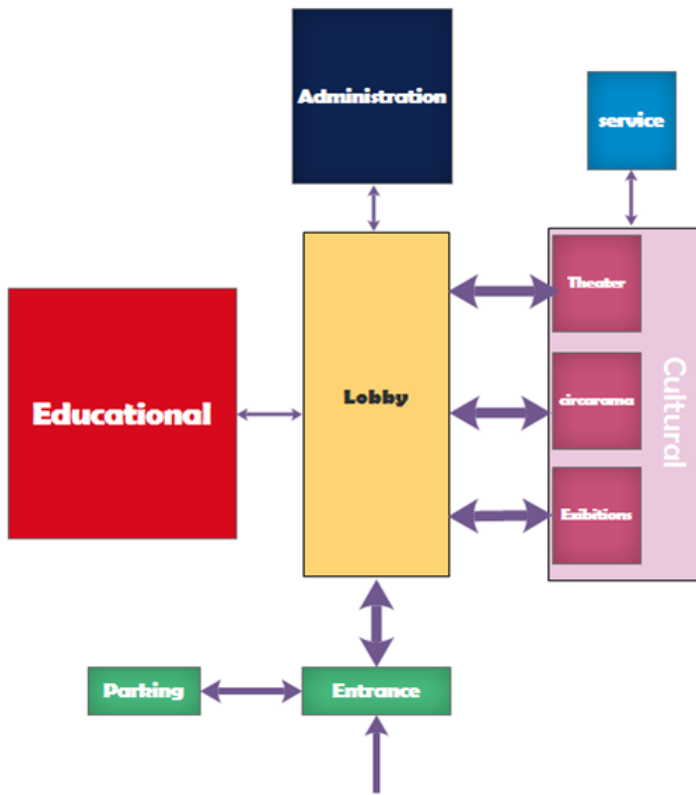


Figure 22- visitors movement

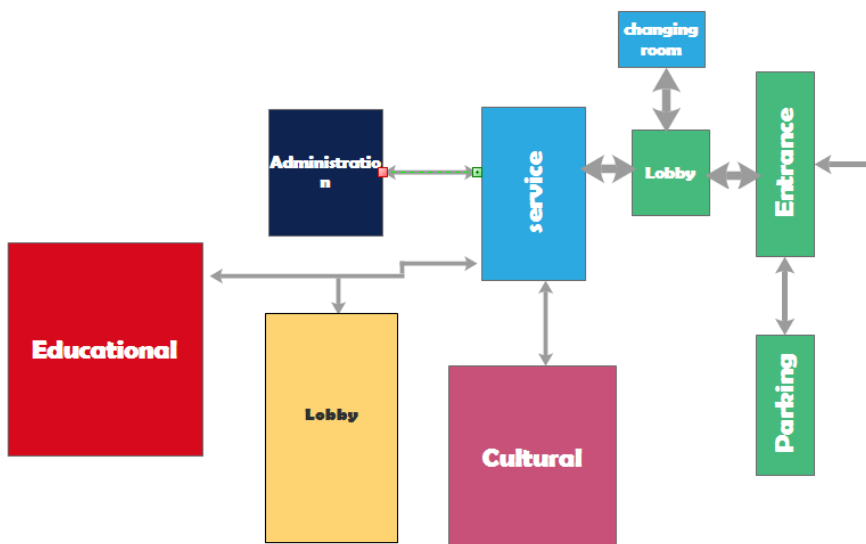


Figure 23- workers movement

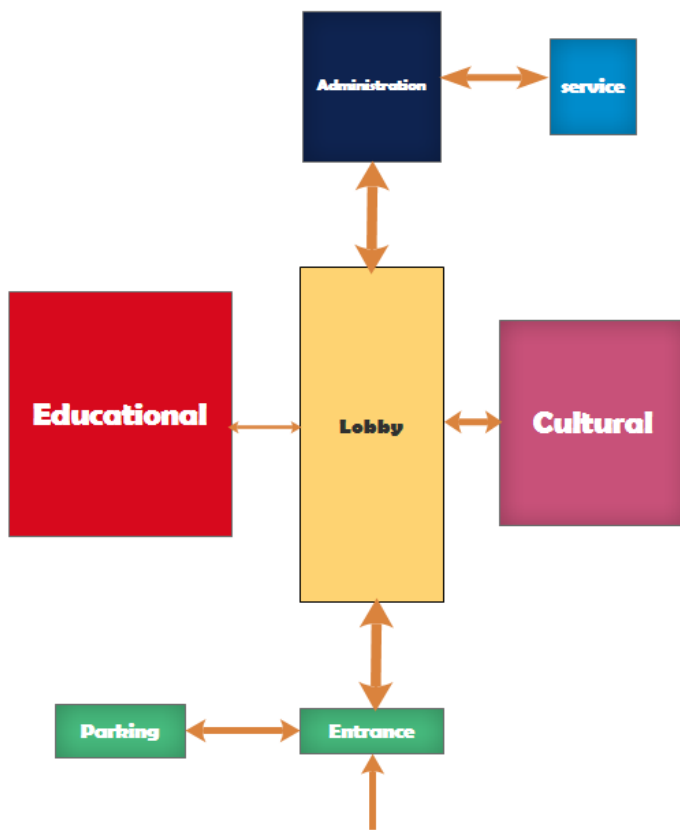


Figure 24- Administration movement

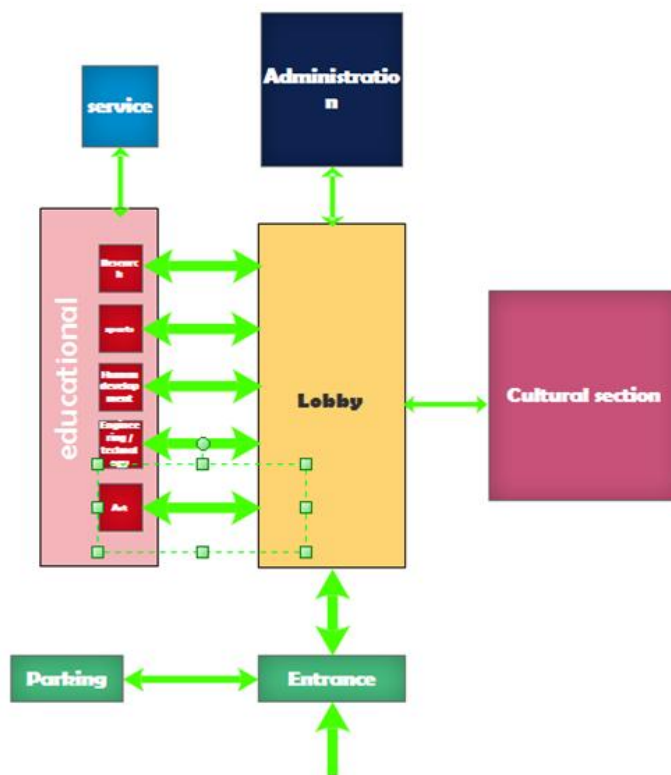


Figure 25- students movement



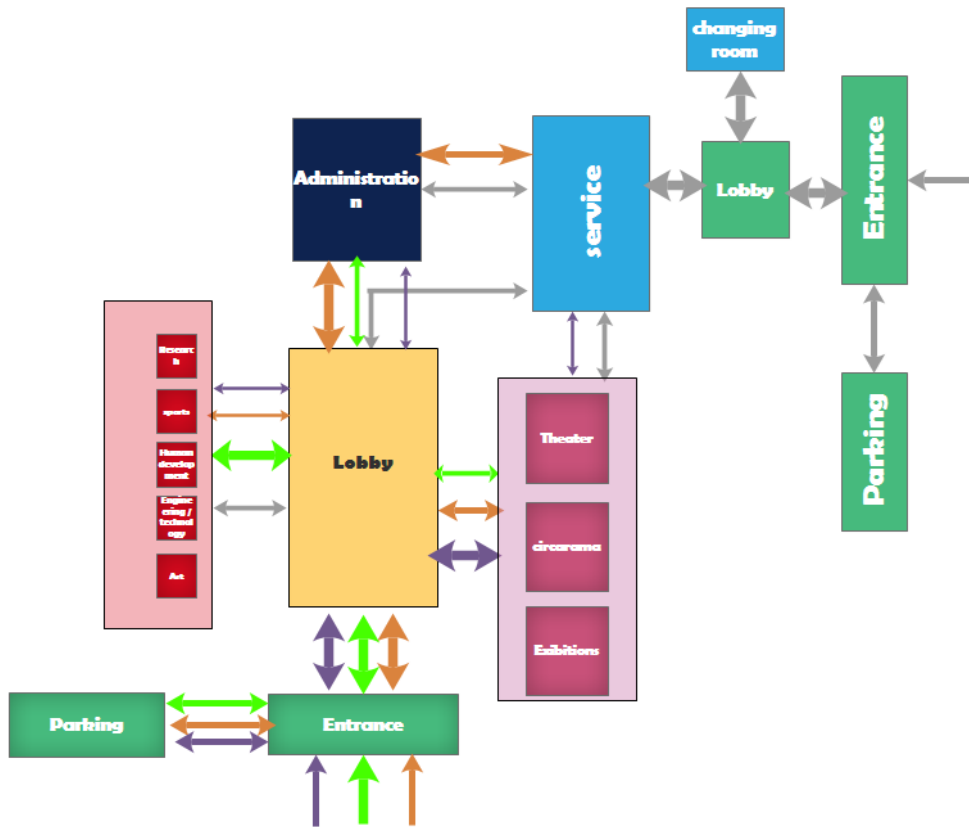


Figure 26- general movement



3.5 Bubble diagrams

General Bubble Diagrams :

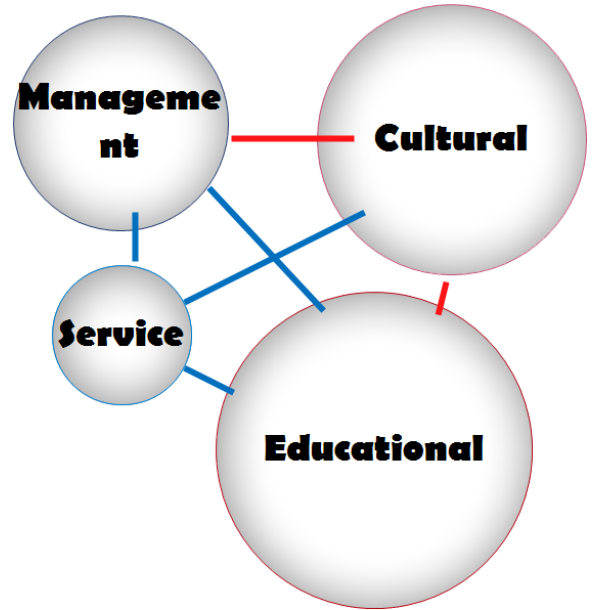


Figure 27 general diagram

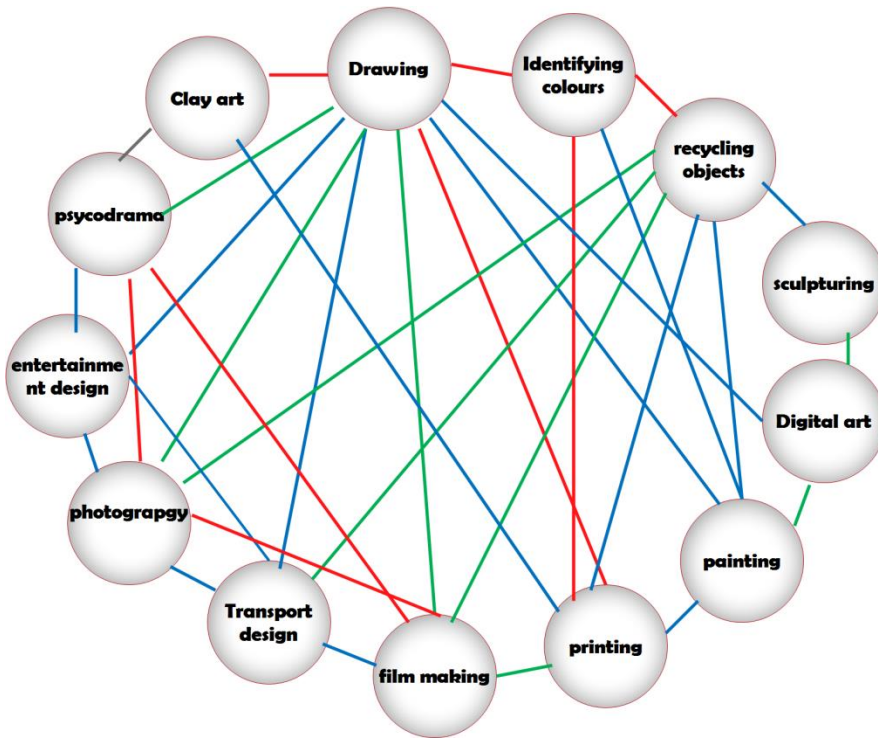


Figure 28 art activities



Art activities Bubble



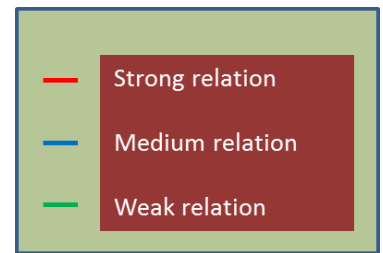
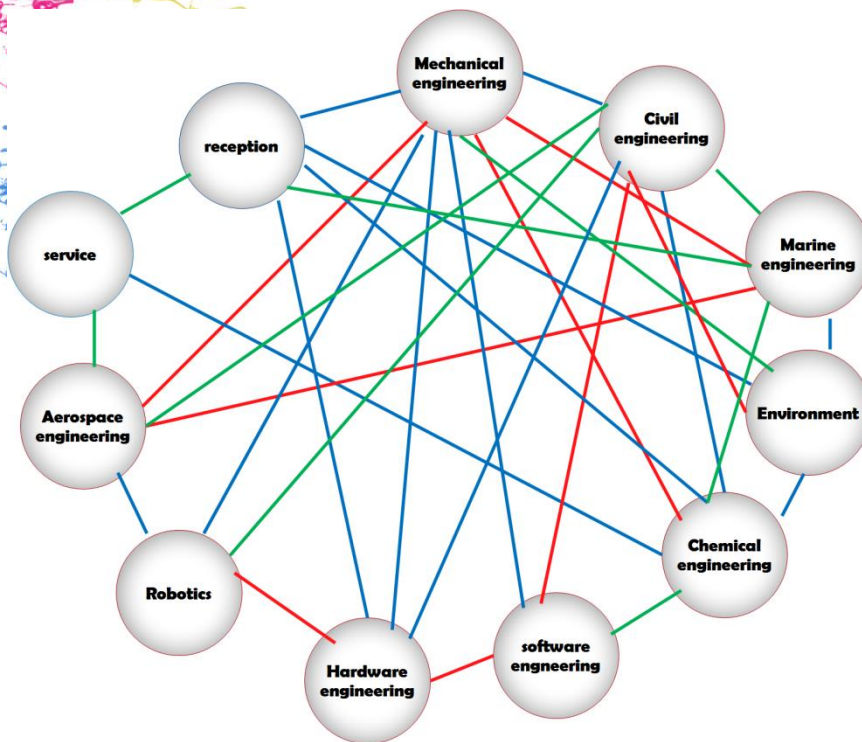


Figure 29 engineering activities

Engineering activities

/

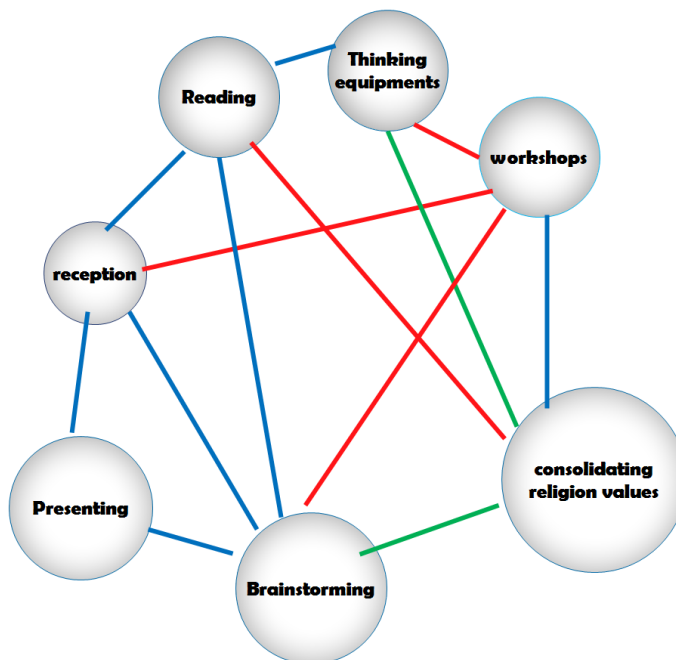


Figure 30- human development

Human development activities



Management activities

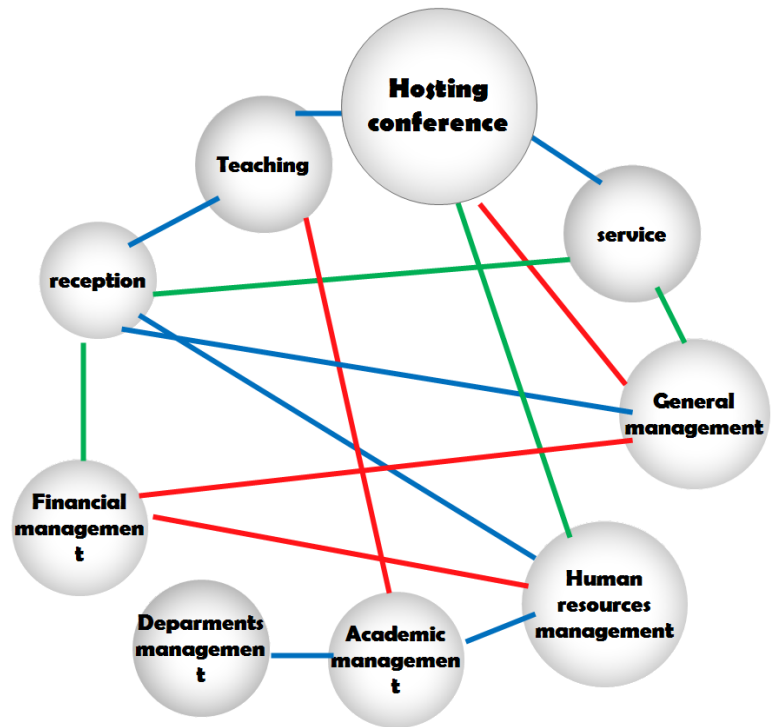


Figure 31 management activities

Service activities

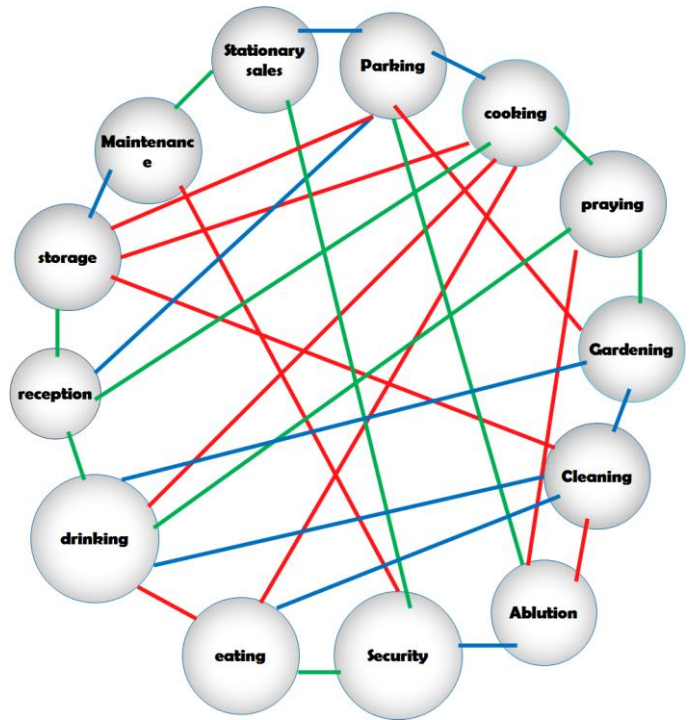


Figure 32 service activities

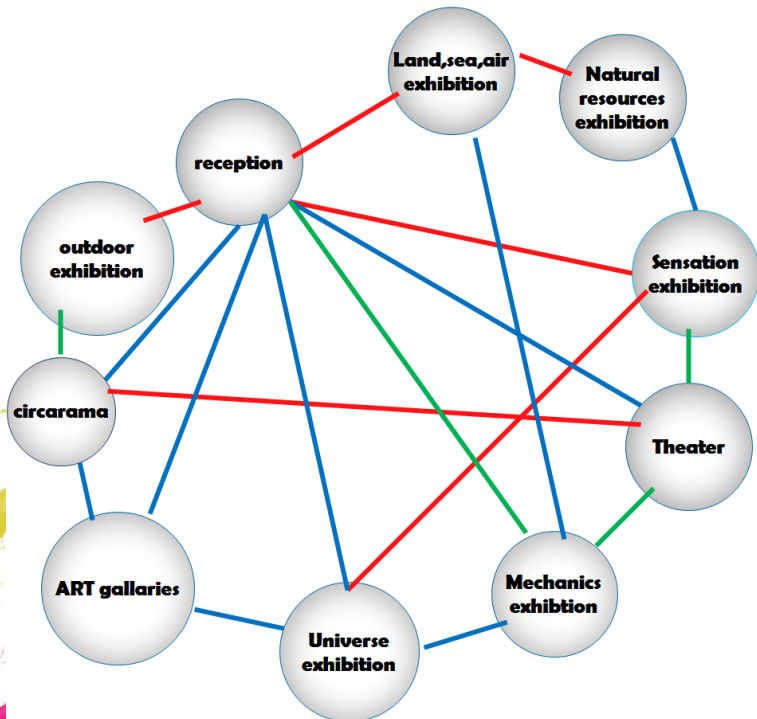


Figure 33 cultural activities



3.6 functional matrix

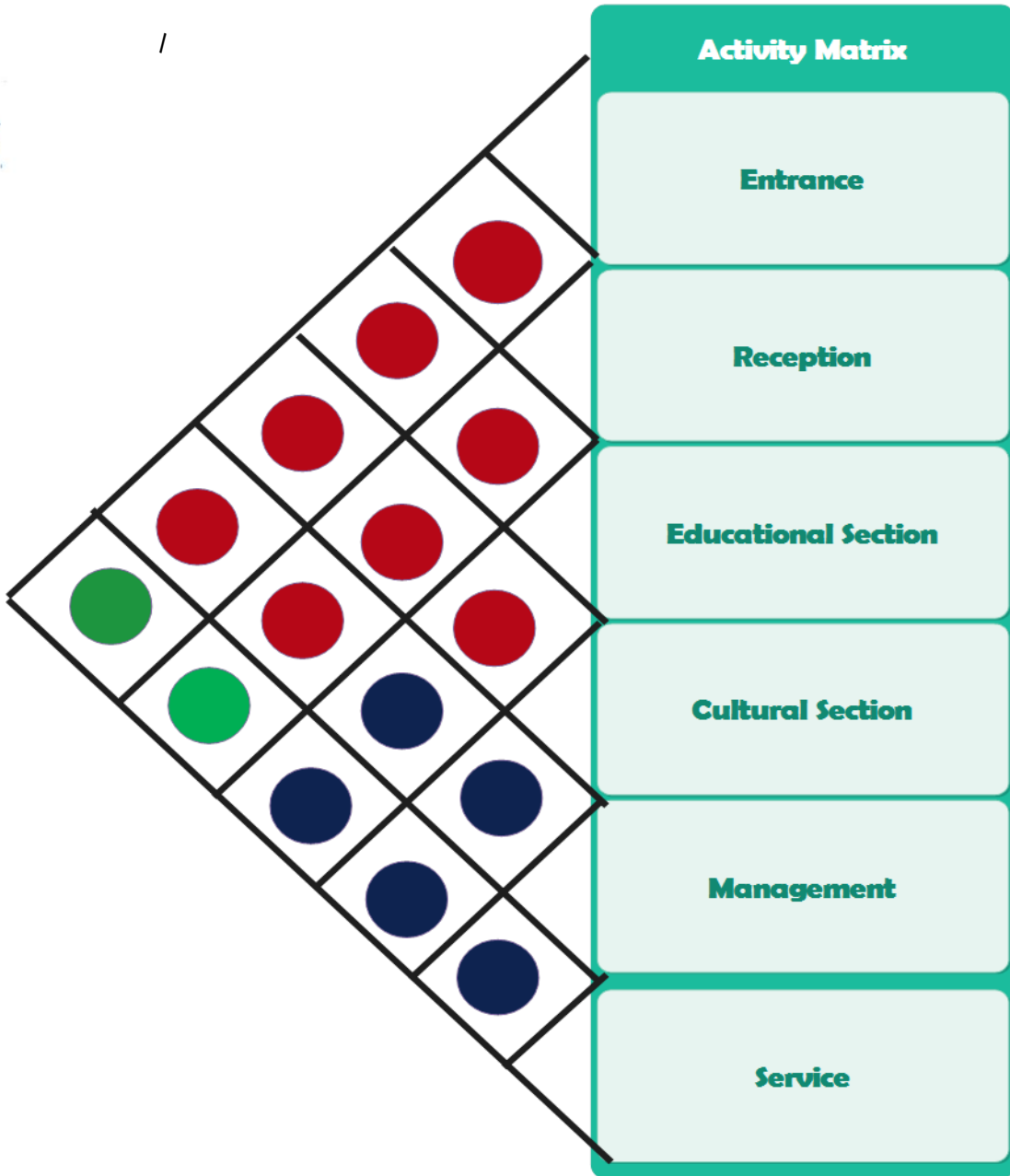
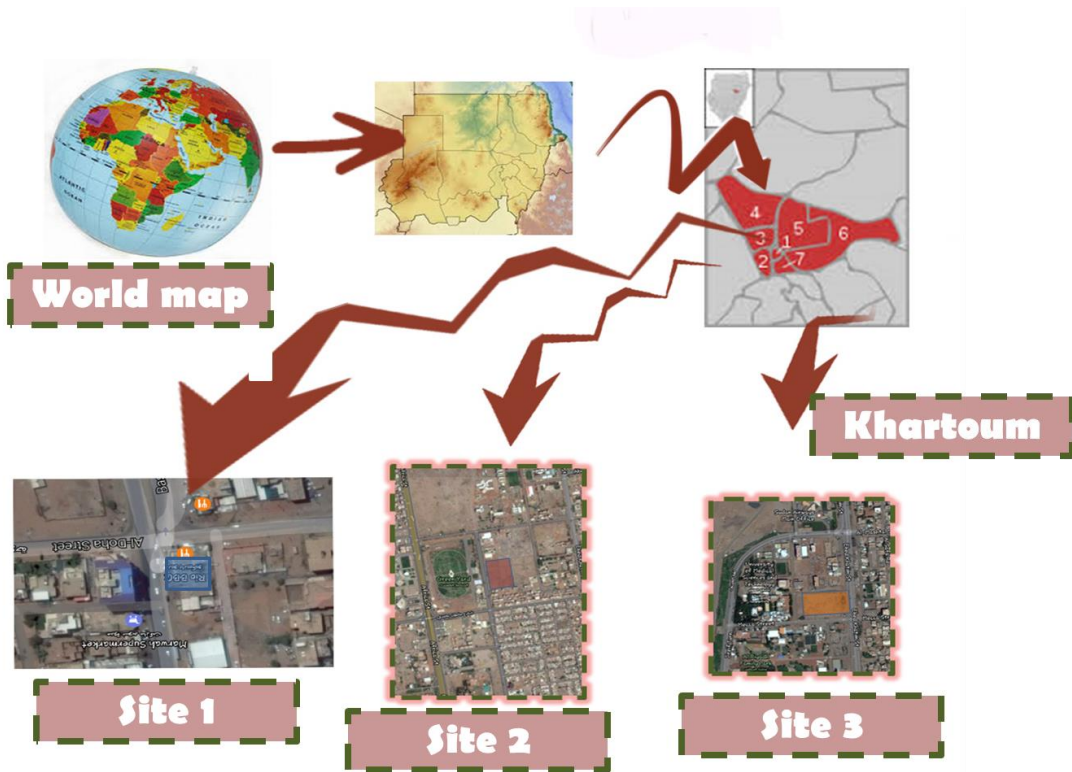


Figure 34- functional matrix

3.7 Site comparison



Site 1:

In Al Khartoum Al manshiya

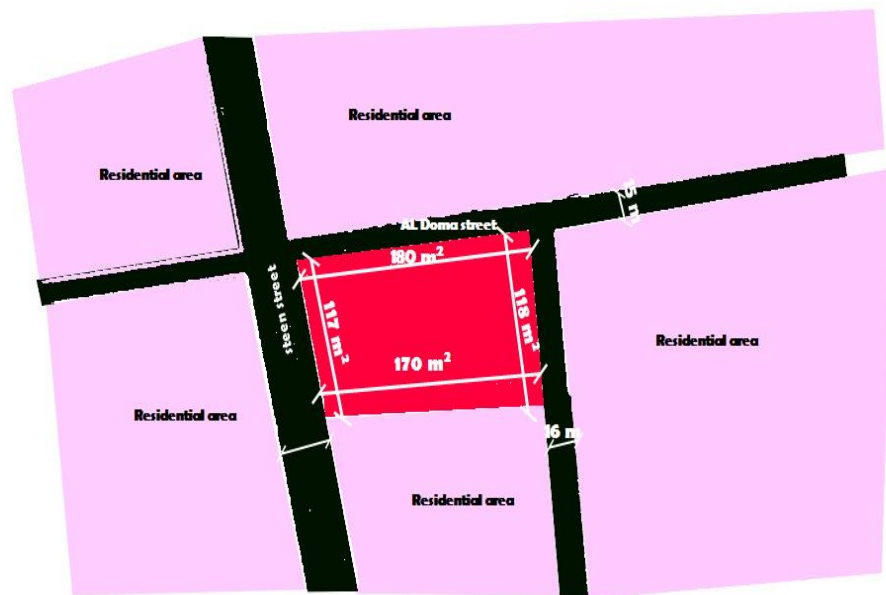


Figure 35 site 1

Total area: 19,040 m²

Dimensions of the site: 112*170

Site Neighboring's:

Northern side is the dwha street

Southern part is residential neighborhood

Western side is 60th street

Eastern side is a local road

Site effect on the neighboring:

Easer accessibility to the

site from the residential area to the students

Safety for the students to

enter the institute from a local

road than a main road

Neighboring effect on the site:

Calmness of the residential neighborhood

Accessibility is easy from 60th street

SITE 2:

In AL Khartoum Arkawet





Total area : 22,800 m²

Dimensions of the site: 120*190

Site Neighboring:

North South of Afra Mall

East of airport street

West of ebaid katim street

South of Al rawda family park

Site effect on the neighboring :

Easier accessibility to the site from the airport street for the students

Neighboring effect on the site:

Noisy from all the directions

SITE 3:

Al Khartoum, Alrawda neighborhood

Total area : 24,934 m²

Dimensions of the site: 137*182

Site Neighboring:

Northen side is the Dar Aljiraha, security center (jihaz al amn)





Southern part is residential neighborhood, Al riyad park

Western side is Mamoon university

Eastern side is a Farmers club , churchs complex

Site effect on the neighboring :

Easer accessibility to the site from the residential area to the students

Safety for the students to enter the institute from a local road than a main road

Neighboring effect on the site:



Figure 37 site 3





Calmness of the residential neighborhood

Accessibility is easy from street

Table 2- site comparison chart

Category	Percentage	Site 1	Site 2	Site 3
Location	10%	8%	10%	10%
Distance from service center	10%	7%	10%	10%
View and surroundings	25%	18%	10%	23%

Accessibility	15%	15%	15%	15%
Neighboring area	10%	10%	5%	10%
Site value	5%	5%	5%	5%
Shape and orientation	15%	12%	9%	14%
Total	100%	81%	69%	93%

Site chosen is 3rd one



3.8 site analysis

Site Neighboring:

Northern side is the Dar Aljiraha

Southern part is residential neighborhood, Al riyad park

Western side is Mamoon university

Eastern side is a Farmers club , churchs complex

Site effect on the neighboring

1. Easer accessibility to the site from the residential area to the students
2. Safety for the students to enter the institute from a local road than a main road

Neighboring effect on the site:

1. Calmness of the residential neighborhood
2. Accessibility is easy from street

Characteristics of the chosen site:

- a. Surrounded by 3 roads
- b. The long side of the site is directed towards the north
- c. Good area and flexible for activities

Service of the site:

Main water line in Abid katim street and makkah street , Main electricity line in Abid katim street

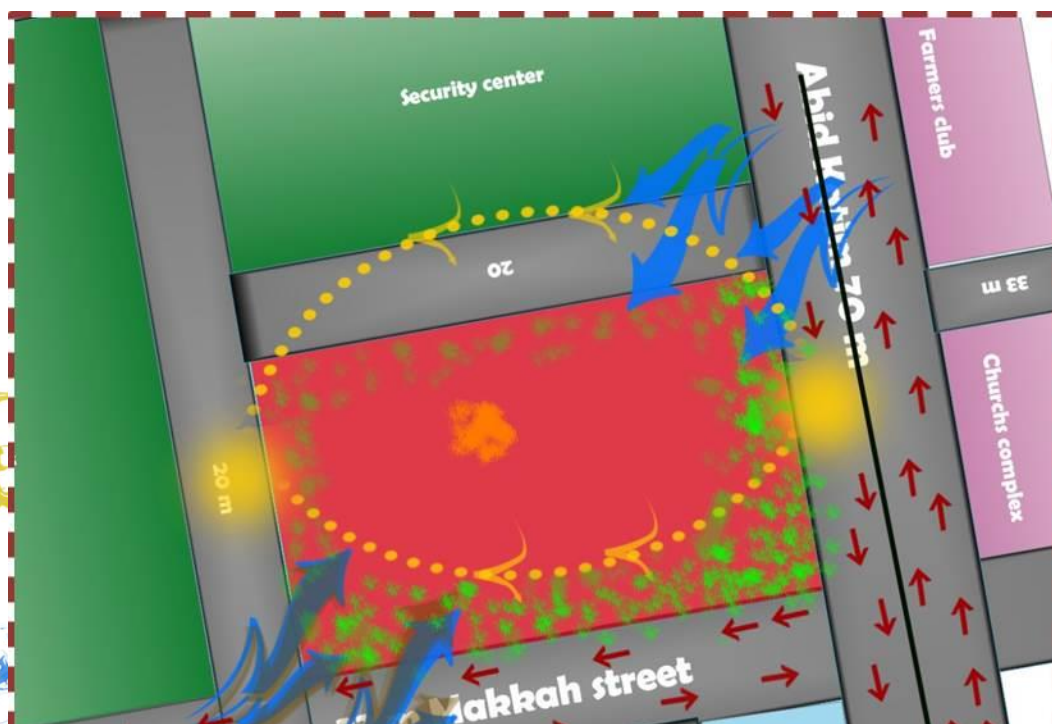


Figure 38 site analysis



Design guidelines:

Environmental Analysis:

Wind movement:

Maximum velocity of wind is 10 miles/hours in December and January

Highest wind velocity in the month of april

Lowest wind velocity in the month of july

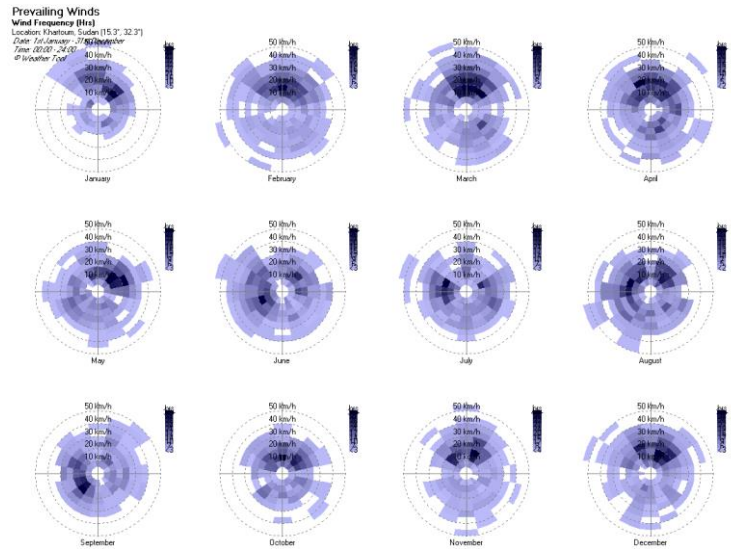


Figure 39 general wind rose

According to that:

A Belt of trees must be planted in the direction from which dusty wind approaches the site (south east direction) to purify the air

To give the optimum orientation to the spaces that needs maximum natural ventilation (croos ventilation) towards the direction of the wind north east

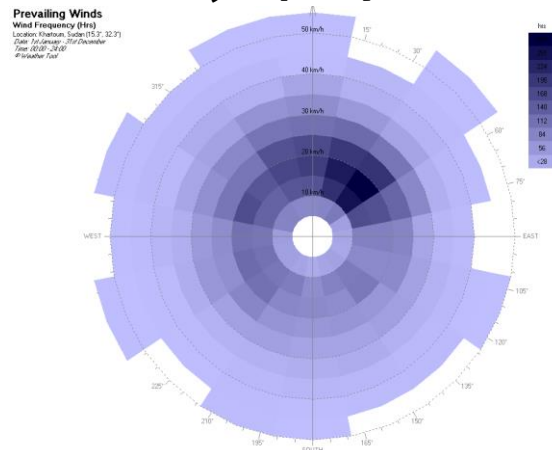


Figure 40 wind rose

This figure shows the annual temperature of Khartoum. We could see that most of the year from March to October the temperature is relatively high between 40 c to 45 c. (hot dry climate)

In summer:

Highest temperature in the month of may (42.7°C)

Lowest temperature in the month of January (31°C)

In Winter:

The temperature decreases and the air is mositured





According to that:

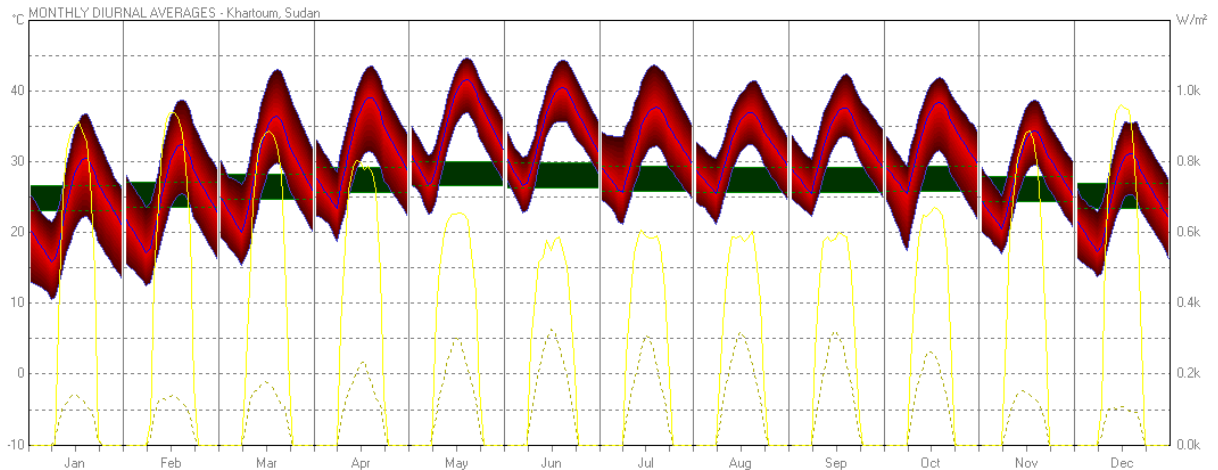


Figure 41- sunight and heat analysis chart

To put into consideration the changes of the temperature in different seasons in orientation, using suitable finishing materials and thermal and humidity insulators. Windows are closed or sealed through winter season to avoid cold dry dusty prevailing-winter wind.

More developed strategies using light weight verandas, small shaded openings and court yards are applied to dwellings in similar climatic conditions

Rainfall and humidity:

- Drain the rainwater through inclinations in roofs through downpipes to the ground that has specific inclinations that would lead the water into drainage pipes ...**
-
- Soil & Topography:**
- Clay soil ... Use isolated footings and there are no obstacles in the site.**
- Views:**
- No interesting views from all the directions.**

Noise and its effects on the site:





- ❑ In the northern and western side of the Site the area is relatively calm which indicates the placement of studios labs and classrooms in these sides
- ❑ The Eastern and southern side are noisy and polluted because of the main streets and al riyad park which indicates the Placement of the sport section in these sides and the cultural section too

3.9 The indications and guidelines

Table 3 indications and guidelines chart

<u>Indications</u>	<u>Guidelines</u>
<p><u>Prevailing wind</u></p> <p><u>Heat</u></p>	<p><u>A Belt of trees must be planted in the direction from which dusty wind approaches the site (south east direction) to purify the air</u></p> <p><u>To give the optimum orientation to the space that needs maximum natural ventilation (cross ventilation) toward the direction of the wind north east</u></p>
<p><u>Topography</u></p>	<p>❑ <u>Clay soil ... Use isolated footings and there are no obstacles in the site.</u></p>
<p><u>Rainfall</u></p>	<p>❑ <u>Drain the rainwater through inclination in roof through downpipes to the</u></p>





	<u>ground that has specific inclination; that would lead the water into drainage pipes; ...</u> <u>□</u>
<u>Surrounded by 2 main roads; and 2 local roads;</u>	<u>The main entrance will be from the southern side of the site and the service entrance from the northern side from the local road</u>
<u>Noise pollution from the north eastern side</u>	<u>Put spaces that are not effected by noise like the sport section and playing grounds;</u>

3.10 zoning





Chapter Four

The Design Concept and the design

4.1 The Concept :

The Concept of the project initiates; the understanding of infinite care for creativity in a country that has a lot of great minds .

Infinity symbol + hand + bubble = the inspiration for the project's concept

4.2 The development of the idea

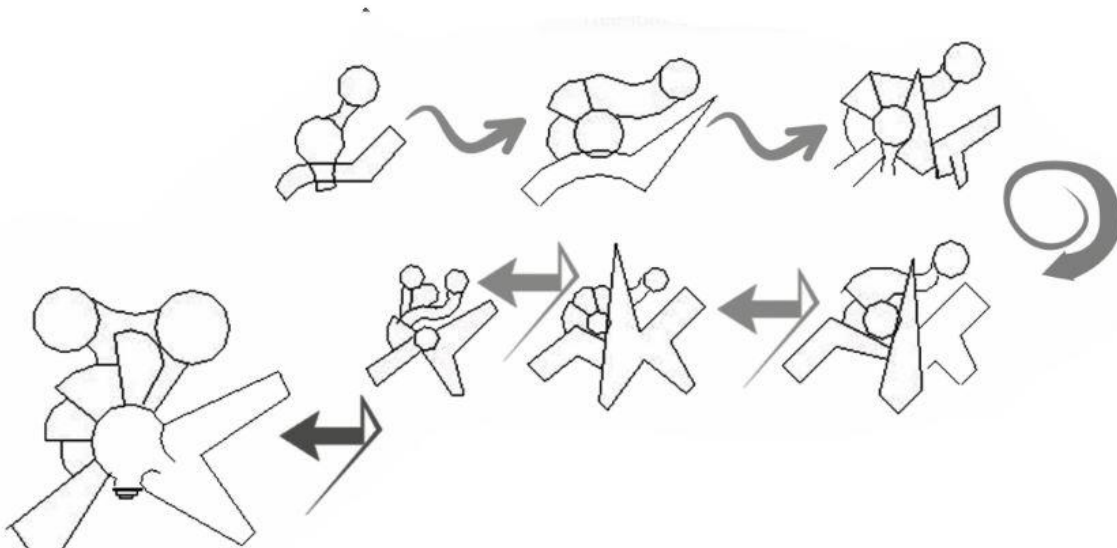


Figure 42- concept development

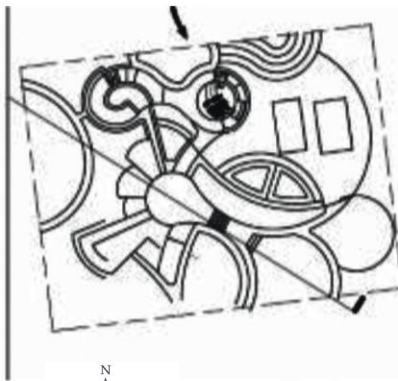
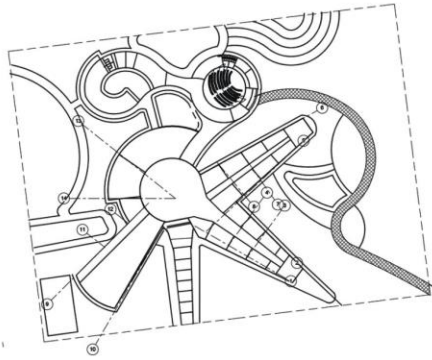
4.3 The development of the design

zoning + Concept = Preliminary design

The Project consist of 5 main zone

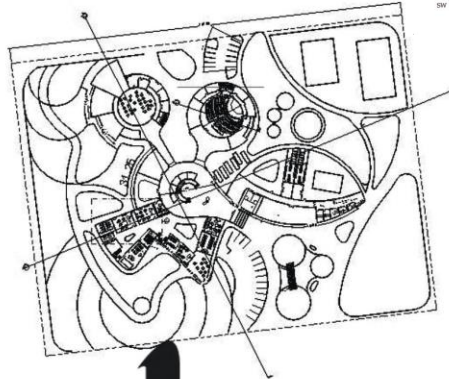
- 1. Educational zone**
- 2. Cultural zone**
 - a. Sports zone**
- 3. Administrative zone**
- 4. Service zone**



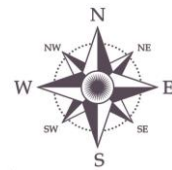
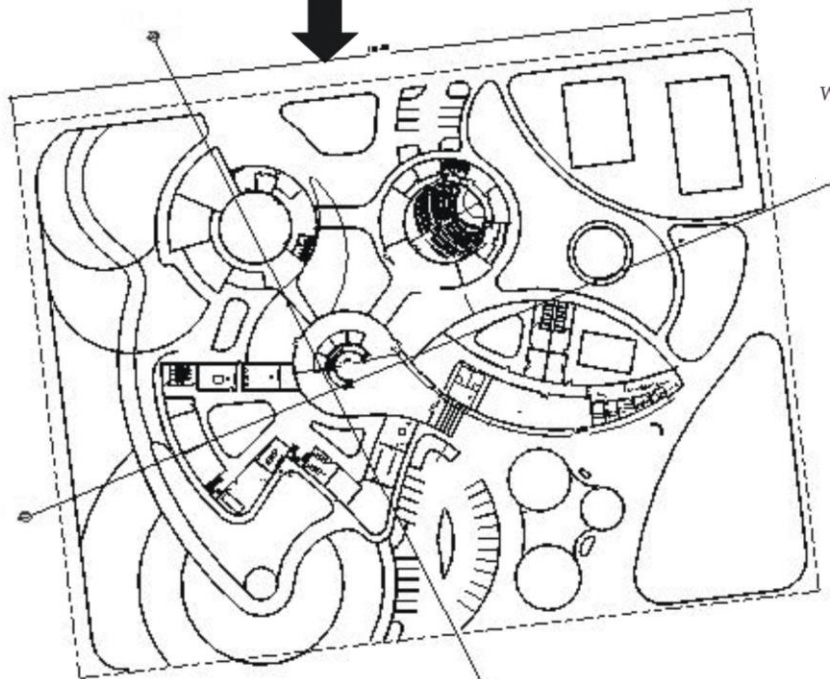


stage 2: the connection between the circles and the main building was weak

stage 1: The form was a bit block when it comes with the idea of the center so i tried making it a bit flexible



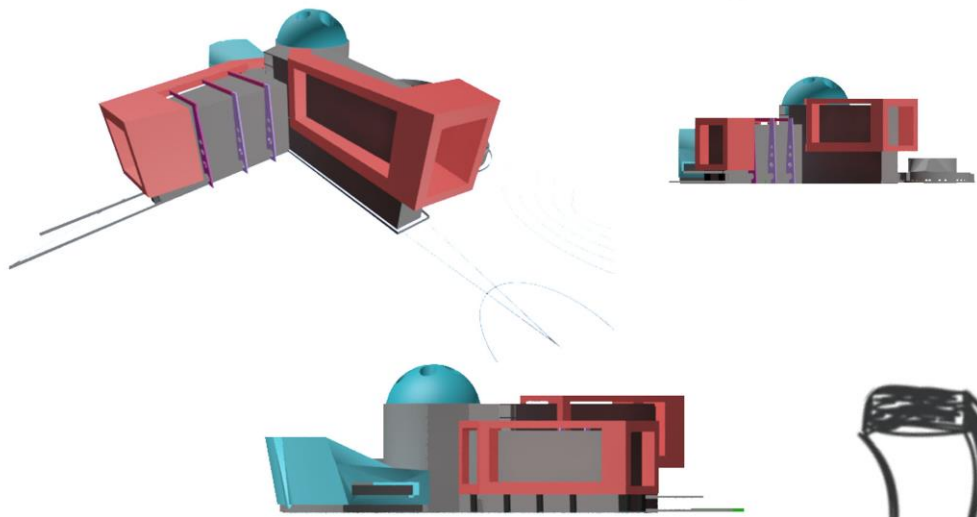
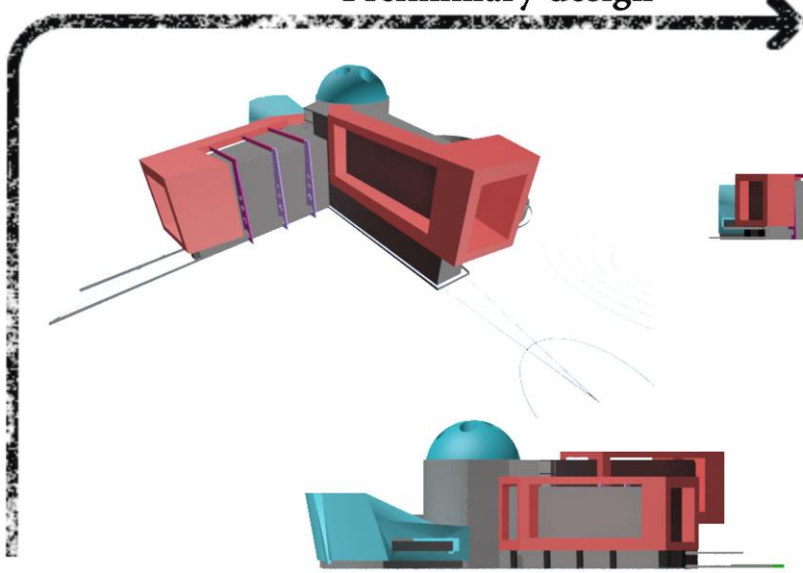
stage 3 : tried getting the circles closer to the main building. Also the number of floors gave the building the feeling of being an administrative building



stage 4: The sports section cluster felt a bit disconnected so made its lines comes out of the circle from the center of the circle in the main lobby ... widened the educational area zone to lessen the number o floors ...



Preliminary design



Developed design

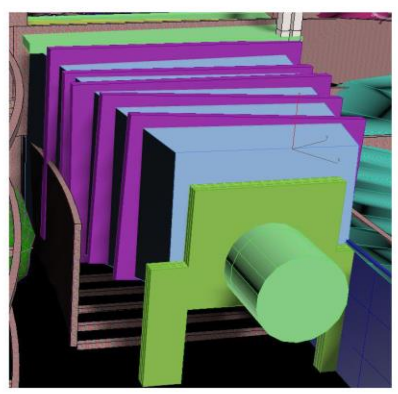
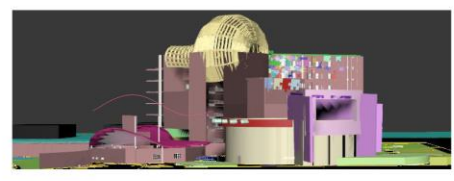
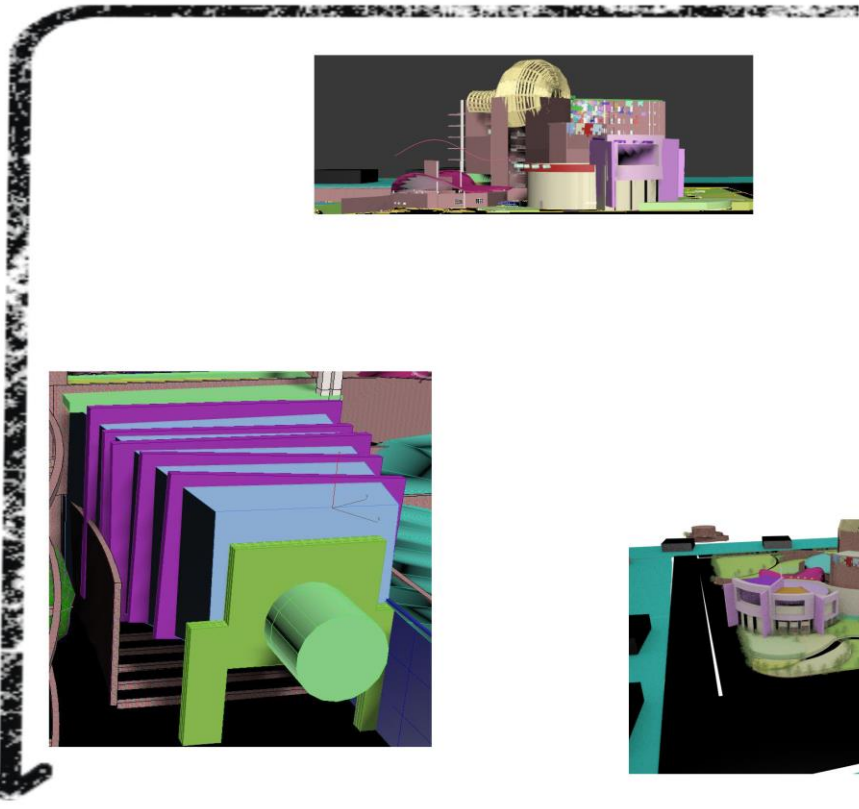


Figure 43 3d development





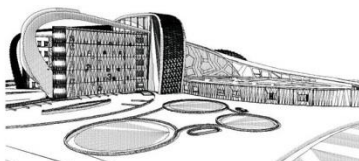
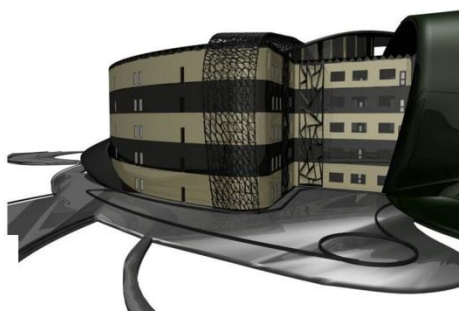
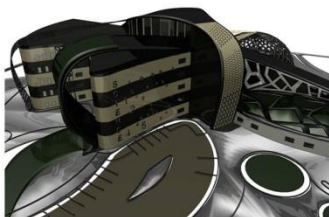
the zones and final development



Ground floor



3ds





Chapter Five (The Technical Solution)

5.1 Structure system:



Figure 44- waffel roofs

Structure systems are been chosen according to:

- 1. The soil type**
- 2. The strength of the system**
- 3. Spans**

The structure systems used is waffle for the main building

The reasons why the structure is used:

- **Savings on weight and materials**
- **Long spans**
- **Attractive soffit appearance if exposed**





- Economical when reusable formwork pans used

- Vertical penetrations between ribs are easy

Ribbed floors consisting of equally spaced ribs are usually supported directly by columns Figure 12. They are either one-way spanning systems known as ribbed slab or a two-way ribbed system known as a waffle slab. This form of construction is not very common because of the formwork costs and the low fire rating. A 120-mm-thick slab with a minimum rib thickness of 125 mm for continuous ribs is required to achieve a 2-hour fire rating. A rib thickness of greater than 125 mm is usually required to accommodate tensile and shear reinforcement. Ribbed slabs are suitable for medium to heavy loads, can span reasonable distances, are very stiff and particularly suitable where the soffit is exposed.

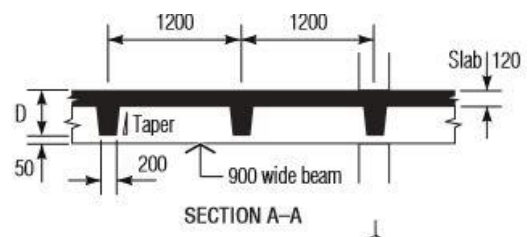


Figure 45 waffle section

Slab depths typically vary from 75 to 125 mm and rib widths from 125 to 200 mm. Rib spacing of 600 to 1500 mm can be used. The overall depth of the floor typically varies from 300 to 600 mm with overall spans of up to 15 m if reinforced, longer if post-tensioned.

Space frame is used for the Conference Hall

Advantages of Space Frames

Factor Description

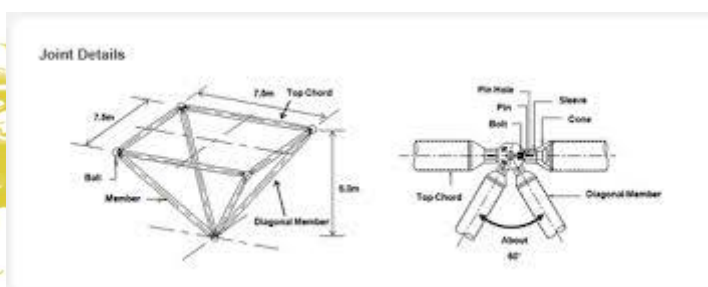


Figure 46 space frame detail

1. Lightweight This is mainly due to the fact that material is distributed spatially in such a way



that the load transfer mechanism is primarily axial; tension or compression. Consequently, all material in any given element is utilized to its full extent. Furthermore, most space frames are now constructed with aluminium, which decreases considerably their self-weight.

2. Mass Productivity Space frames can be built from simple prefabricated units, which are often of standard size and shape. Such units can be easily transported and rapidly assembled on site by semi-skilled labor. Consequently, spaceframes can be built at a lower cost.

3. Stiffness A space frame is usually sufficiently stiff in spite of its lightness. This is due to its three dimensional character and to the full participation of its constituent elements.

4. Versatility Space frames possess a versatility of shape and form and can utilize a standard module to generate various flat space grids, latticed shell, or even free-form shapes. Architects appreciate the visual beauty and the impressive simplicity of lines in spaceframes.

Foundation :

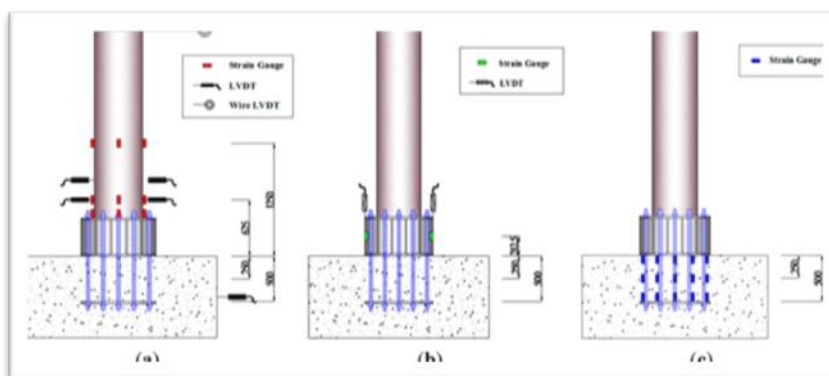


Figure 47- isolated footing

- 1. The foundations are chosen depending on :**
- 2. The soil**
- 3. The number of floors in the building (the load of the building live loads + dead loads)**

4. Soil bearing

5. Depth of the foundation

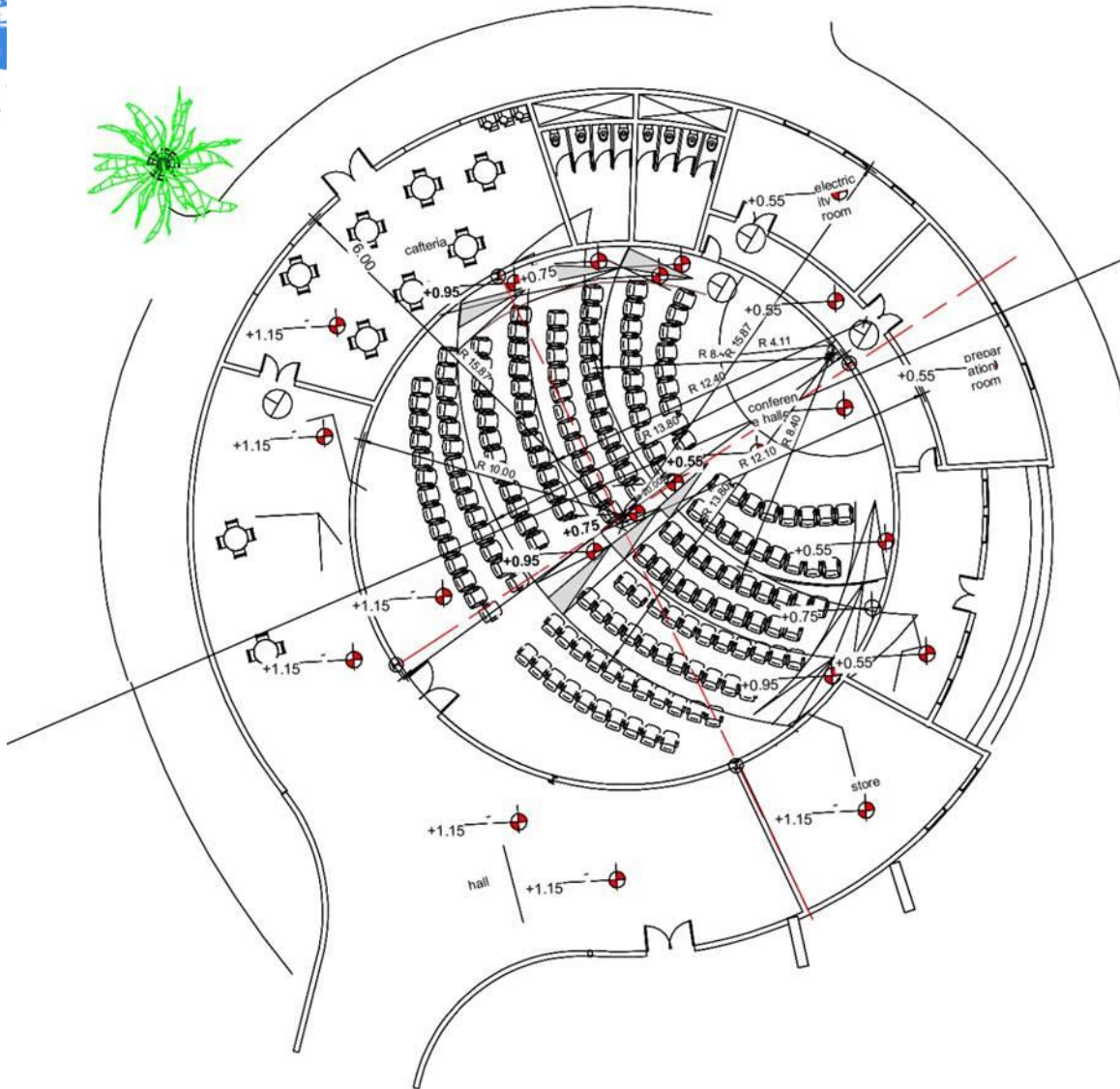


Figure 48- conference hall structure

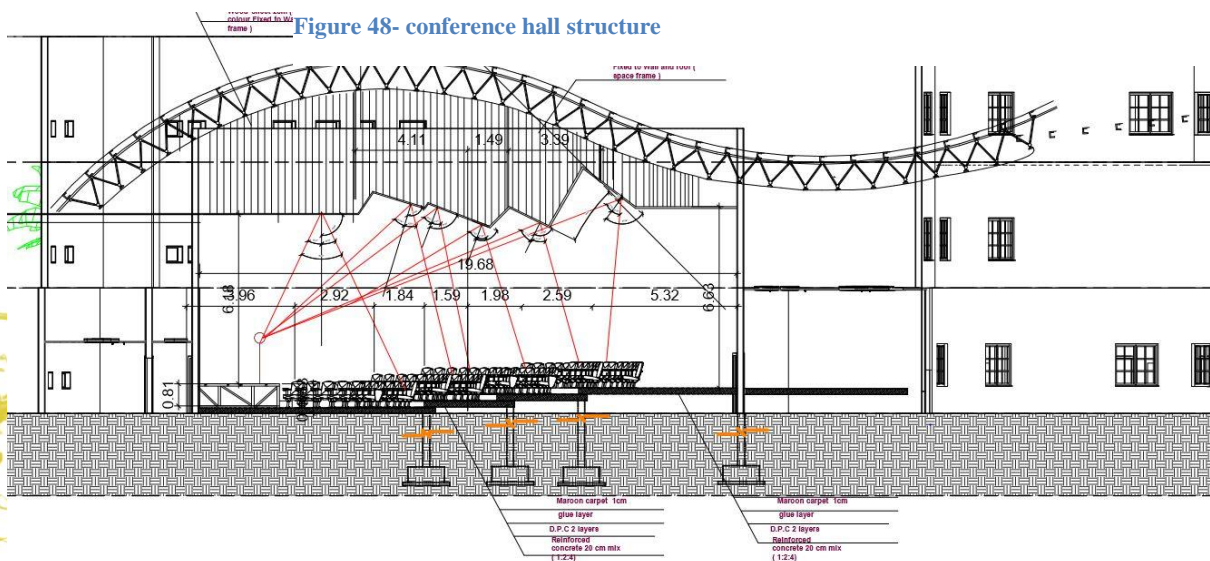


Figure 49- conference hall section



Structure plan:

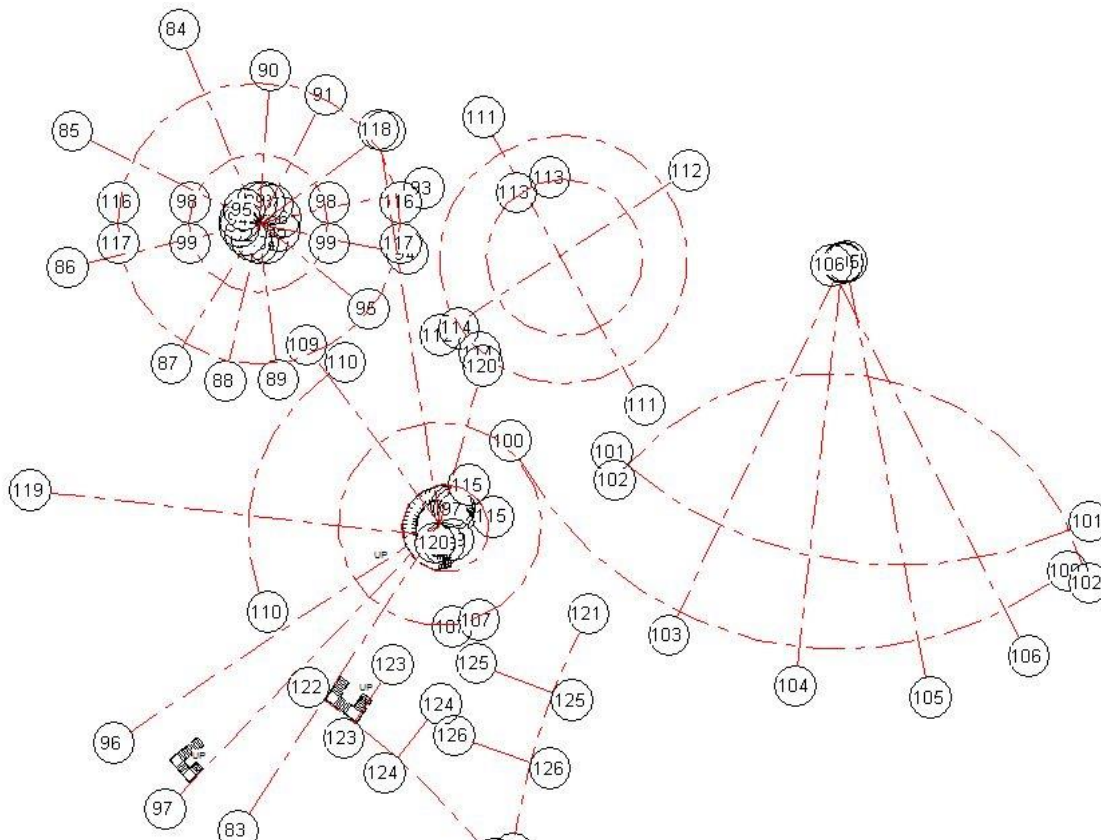
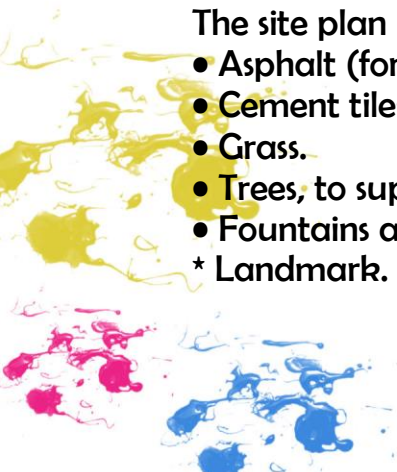


Figure 50- structure plan

5.2 Treatment :

The site plan has different types of finishes on it which are:

- Asphalt (for the parking).
- Cement tiles (in the slab around the buildings).
- Grass.
- Trees, to supply the needed shade and shadow for the project.
- Fountains and water elements.
- * Landmark.



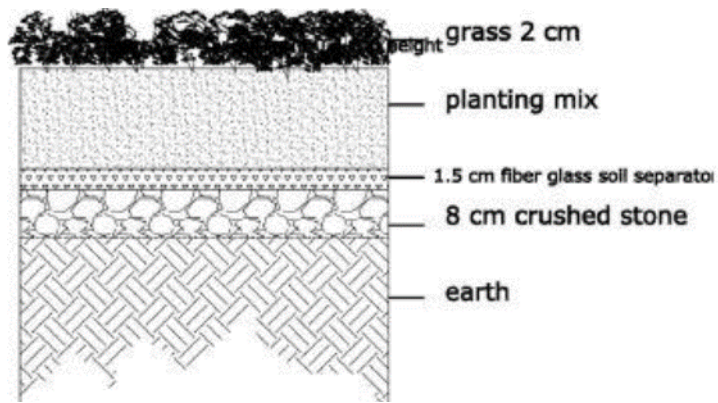


Figure 51- grass section

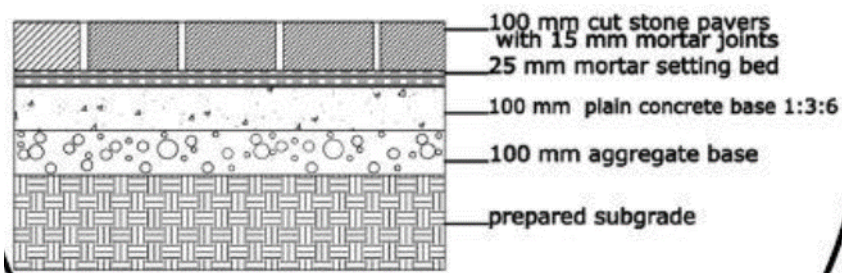


Figure 52 pavement detail

Interior finishing: Floors:

- Porcelain tiles 90cmx90cm in the main corridors and in the lobbies **and** offices.
- Carpet floor in the lecture hall and life drawing studio.
- Wooden floors in the studios.

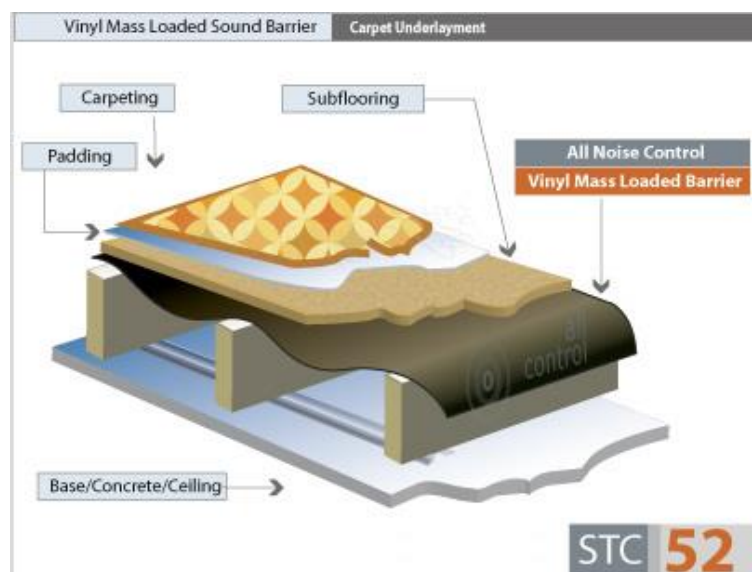


Figure 53 carpet detail





Wall:

- White paint with some stripes of other colors to the offices and corridors and lobbies.
- * Wooden walls for the studios.

Ceiling:

- Gipsen board false ceiling 60cmx60cm.
- * Wooden board false ceiling 60cmx60cm.
- White paint with some colored stripes

Site Treatment

A. Extensive Vegetation

growth medium

filter fabric

moisture retention

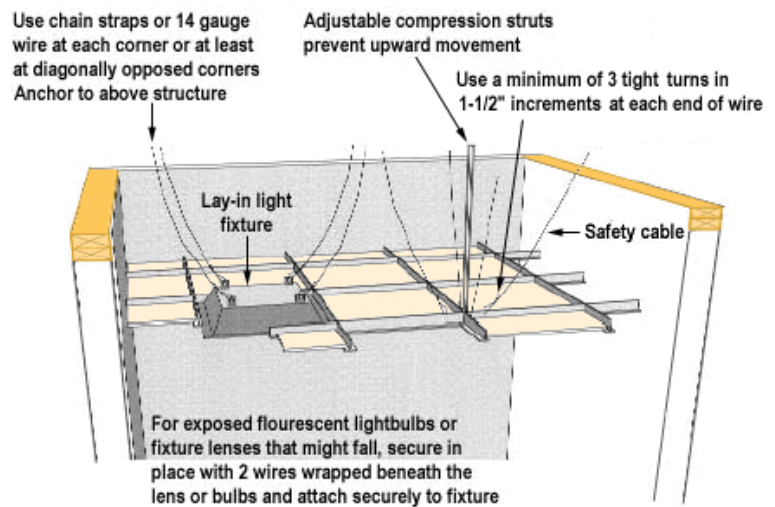


Figure 54- ceiling detail



insulation

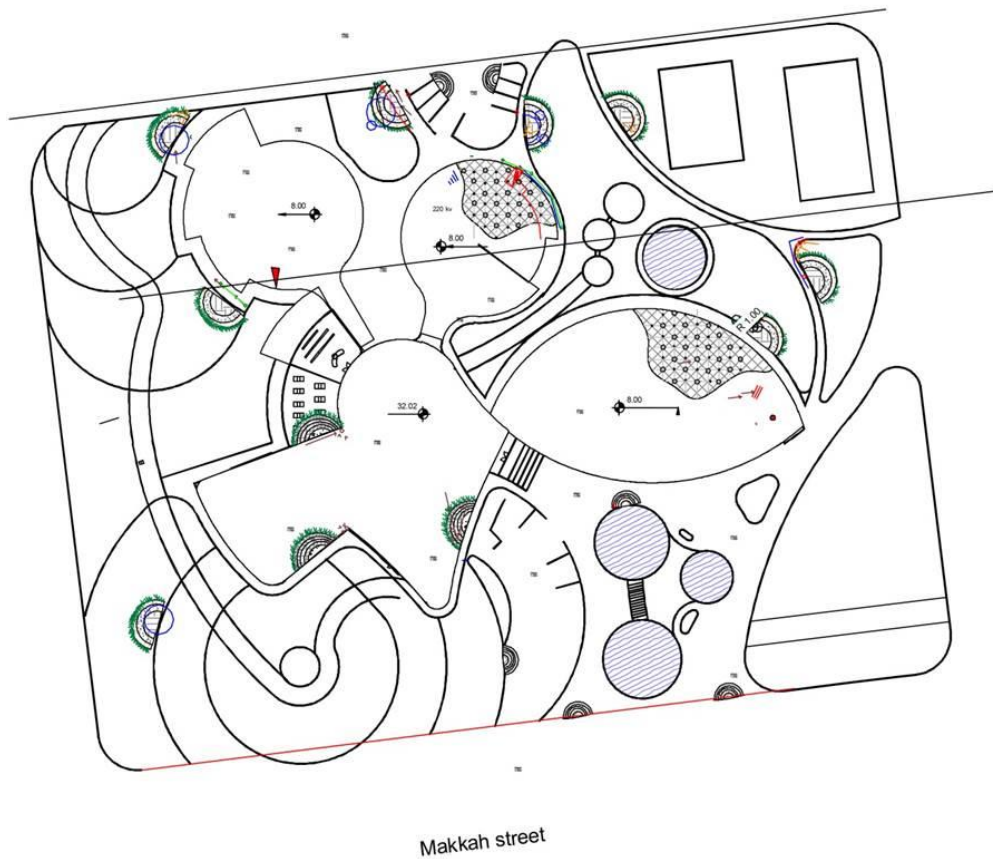


Figure 55- site treatment

roof barrier

protection course

waterproofing membrane (hot rubberized asphalt depicted)

Reinforced concrete waffled slab (20 cm) mix (1:2:4)

B. Silver Aluminum steel 1.00*1.00* 0.25cm

-Insulation material membrane type

-Rafter from steel c section

-Space Frame

Wood Sheet 2cm (Sound Proof) brown colour Fixed to Wall and roof (space frame)

C. Asphalt 3 cm top course, binder course base course sub base course membrane sub grade

D. Green grass, sand 3 cm, stone, earth

part plan for Auditorium

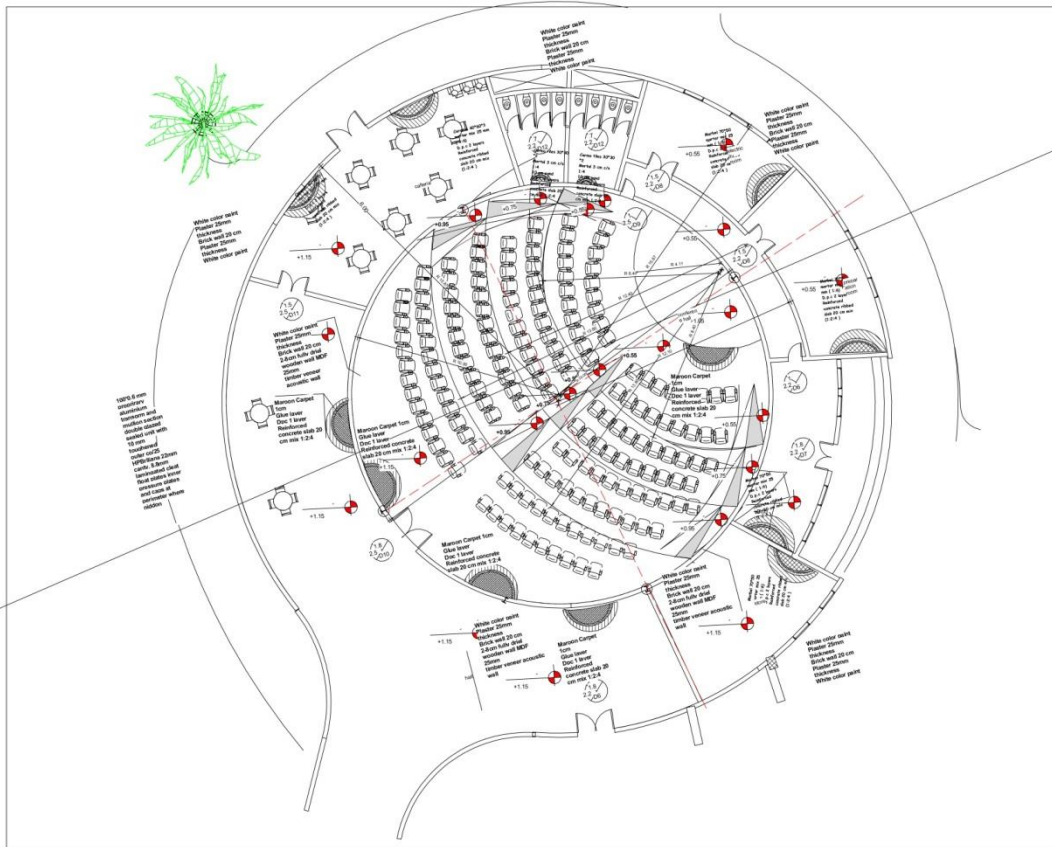


Figure 56 auditorium finishing

5.3 Water supply:

The system chosen is the loop system:

The site is supplied with water from the main line pipe passing through the main street at the eastern side of the site (8 inch diameter) and connected through pipes that forms a closed loop that helps in the balance of the pressure (4 inches) which is then connector to upper water

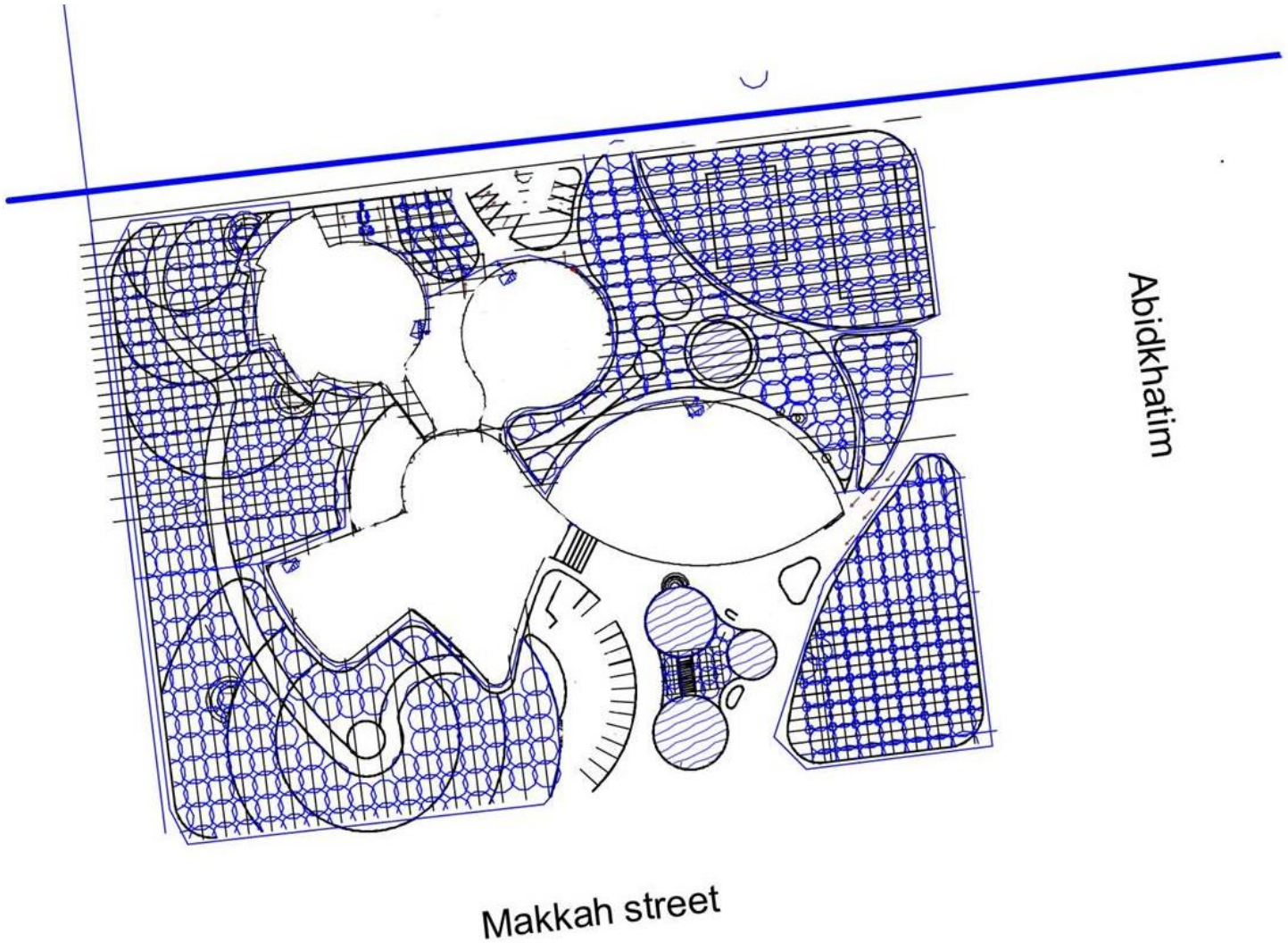


Figure 57- water site



tanks (2 inch diameter) most of the buildings in the project are under 3 floors so they are supplied through a high level tank (on the ceiling).

And connected to a crane pump to secure high pressure, the other buildings that are above 5 floors are supplied through an underground tank and also a high level one and a pump to ensure good pressured water at all times.Landscape water supply is through sprinklers with 6 diameter connecter with 1/2 inch pipes.

Water consumption:

An individual consumes between 40 – 100 liters per day in educational buildings The daily consumption of the individual is calculated according to the following formula: Number of users x Daily consumption of water = Consumption of each person(Quantity of water required in the building):

Calculations:

$$\text{DCW} = 100 \times 1270$$

$$= 127000 \text{ litres}$$


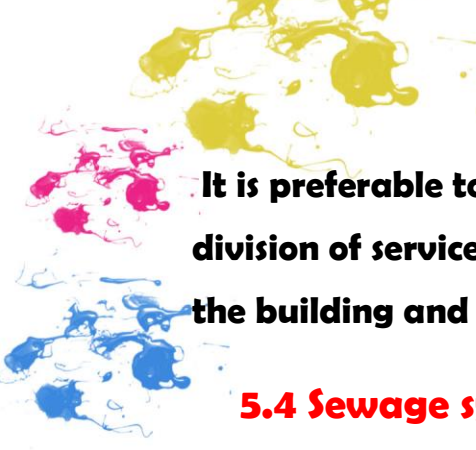
The tanks capacity :

Its according to the cut of water supply which goes between (25% - 100%) from the daily consumed water total with addition to the fire fighting water which it not less than 10 m3

The upper tank capacity = 25% from the total daily consumption of water = 31,750

litre

Number:



It is preferable to use more than one tank to facilitate maintenance and division of services. For example in this project, I put two tanks to feed the building and another tank for fire fighting services

5.4 Sewage system:

It starts from the sanitary fittings through pipes (PVC)to the nearest inspection point (main hole) .) With a slope of 1:80 (because I have more than 80 sanitary fittings throughout the building.

The distance between the main holes is 6 meters. These main holes are connected through PVC pipes

The sewage system:

- the one pipe system was used to the bathrooms.**
- the manholes system was used for the bathrooms, and connected to a septic tank northern side of the site**

5.5 Drainage system:

Surface drainage depends on the nature of the roofs and their purpose.

It is intended to prevent the accumulation of rain water and other water in a particular area, resulting in health problems. The buildings are discharged by inclining it into certain directions, ending with a horizontal element and down to a downpipe, to the sub-drainage streams(sub trenches) and then to the main course (main trench). all the buildings' slope is 1:200.

-all the floors' slope is 1:100.

The slope of the trench 1:400.

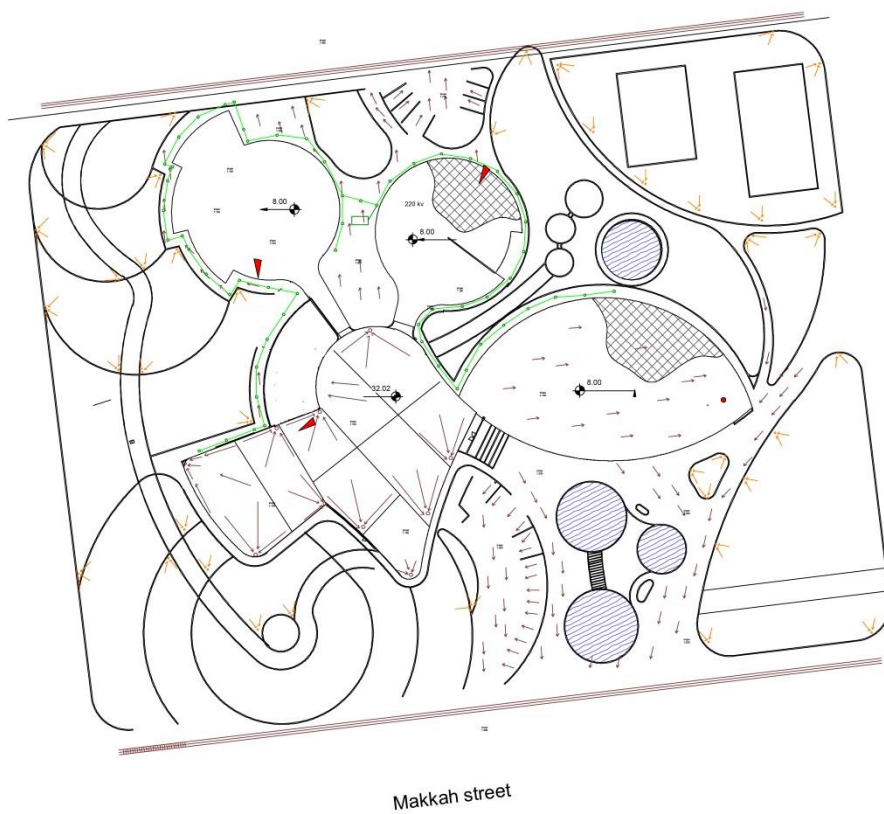


Figure 58- sewage and drainage site



5.6 Electricity Supply:

- the main electricity line is eastern side of the site.
- it enters as a 11kv .
- then it is transformed into 415v.
- and then it is distributed through the main control panel.
- there's also a generator that's connected to the inverter switch to ensure an electrical supply to the site in case of shutdowns.
- site lamps are supplied through solar power panels on each one, and contains battery to save power, it is also connected to the public web in case there are outside factors that weakens the solar power to work properly.

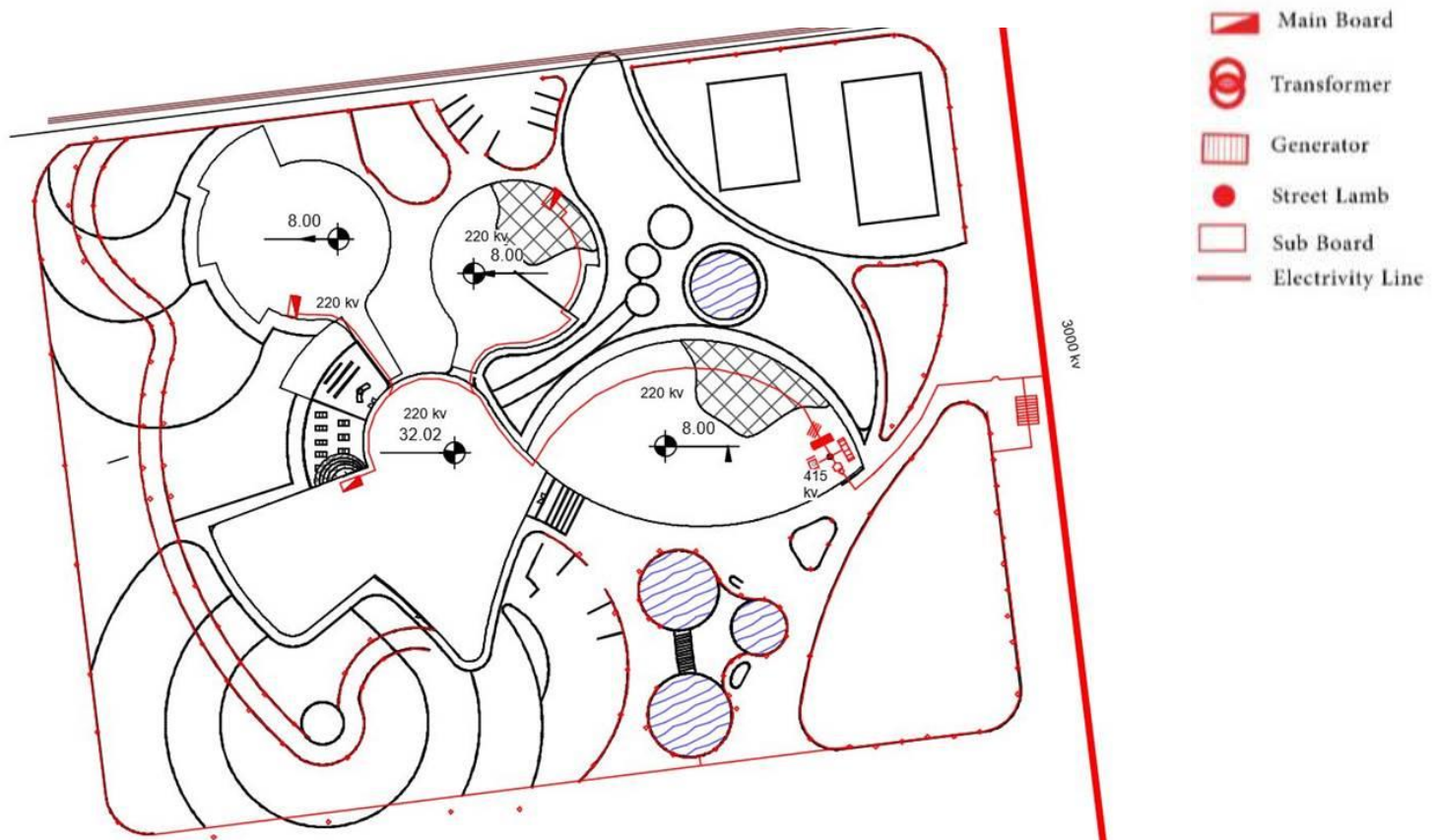


Figure 59 electricity site

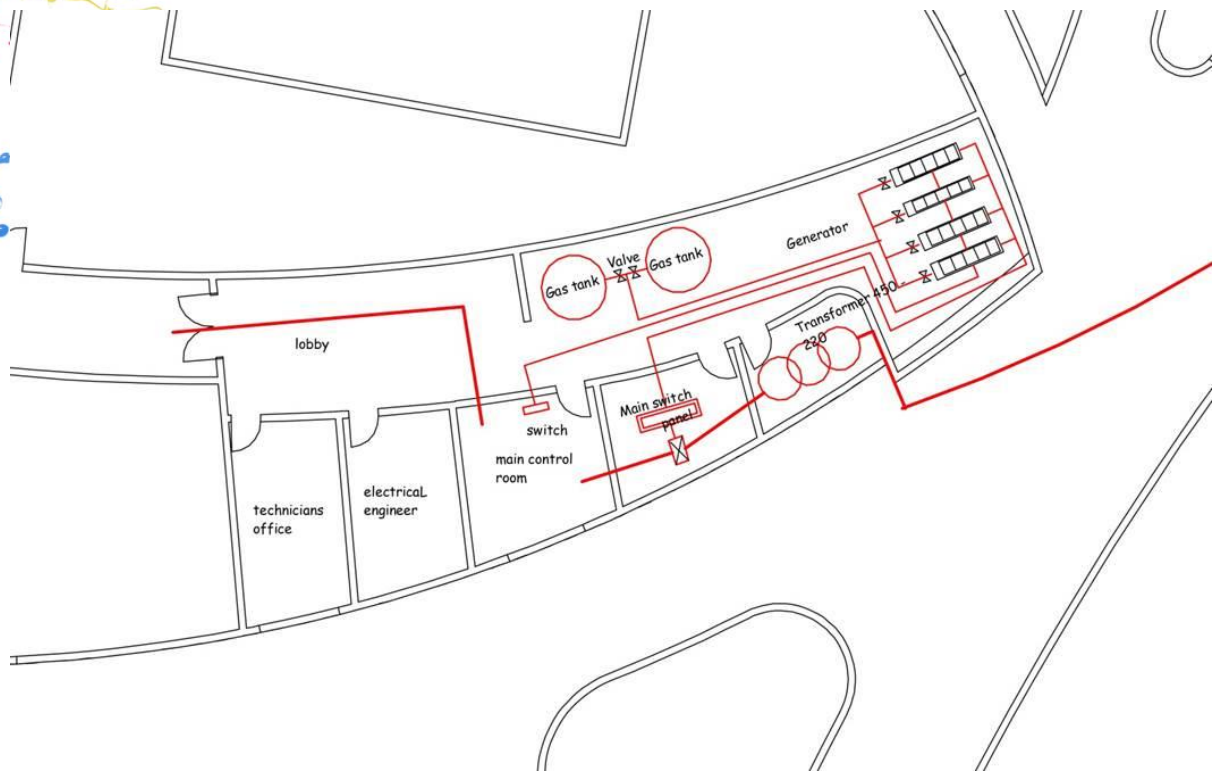


Figure 60- electricity room part plan

5.7 Air Conditioning system:

The system that's been used is the **ALL-AIR system**.

Reasons for choosing this system:

- type of space: multiple spaces.
- the need for the conditioning system : cool and heat.

-major needs: temperature, air renovation, quite environment.

*Controlling this system is central and there is different sizes of spaces.

The system's technical parts:

- Air ducts, one for the supplied air and another for the returned air.
- Supply air outlets, which diffuses the clean air.
- Returned air outlets, which return hot air.
- Handling unit, which is the supplier and also it process the returned

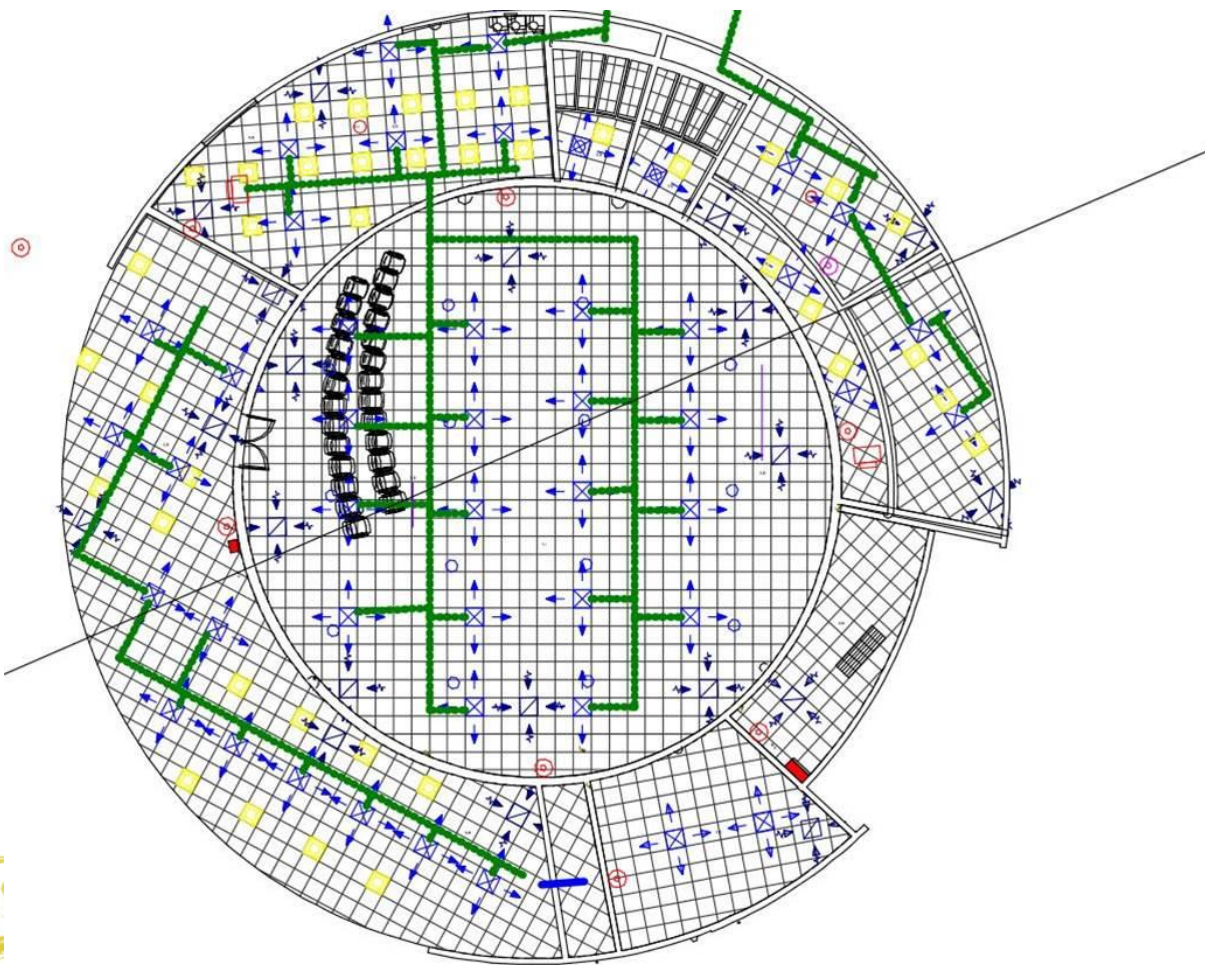


Figure 61- all air part plan connection

air through a filter and a fan.

5.8 Fire fighting system

Fire Fighting can be accomplished through two stages:

Number one: detecting the fire:

which can be done:

***Automatically:**

-this can be done through fire detectors according to the space level of danger and use, and it's either smoke or heat detector, and in this project **HEAT DETECTORS** were used because:

-all materials and furniture are carbon based

-it detects heat from around 57-92 centigrade.

And those detectors are connected to the main control panel which in case of fire immediately sets off the alarm and the sirens and lights for the emergency exits.

***Manually:**

through the manual alarm buttons that works when it is pressed manually.

Number two: putting out the fire:

which can be done:

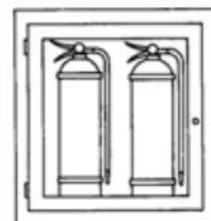
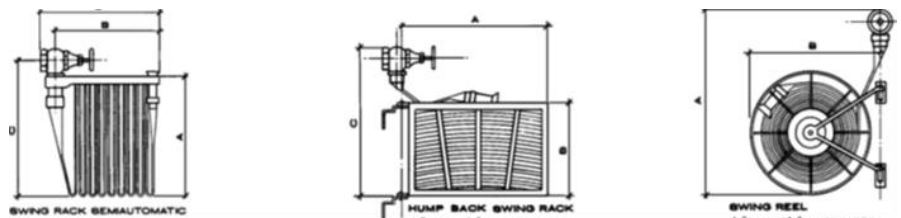
*** Manually : using:**

-hoses: distribute boxes with hoses with a diameter up to 30m.

-Fire extinguishers:

that are distributed in each space close to the door, and near the exits

***automatically:**



TWO 2 1/2 GAL
EXTINGUISHERS
11"X21"X7" TO
21"X21"X8"

using the sprinklers system.

reasons:

- the building's space is over 465m².
- the building's users are over 300 person.

The sprinklers are installed in the ceiling through a water net supplied by a main water pipe. And the sprinklers cover the spaces of 8,12,15m²

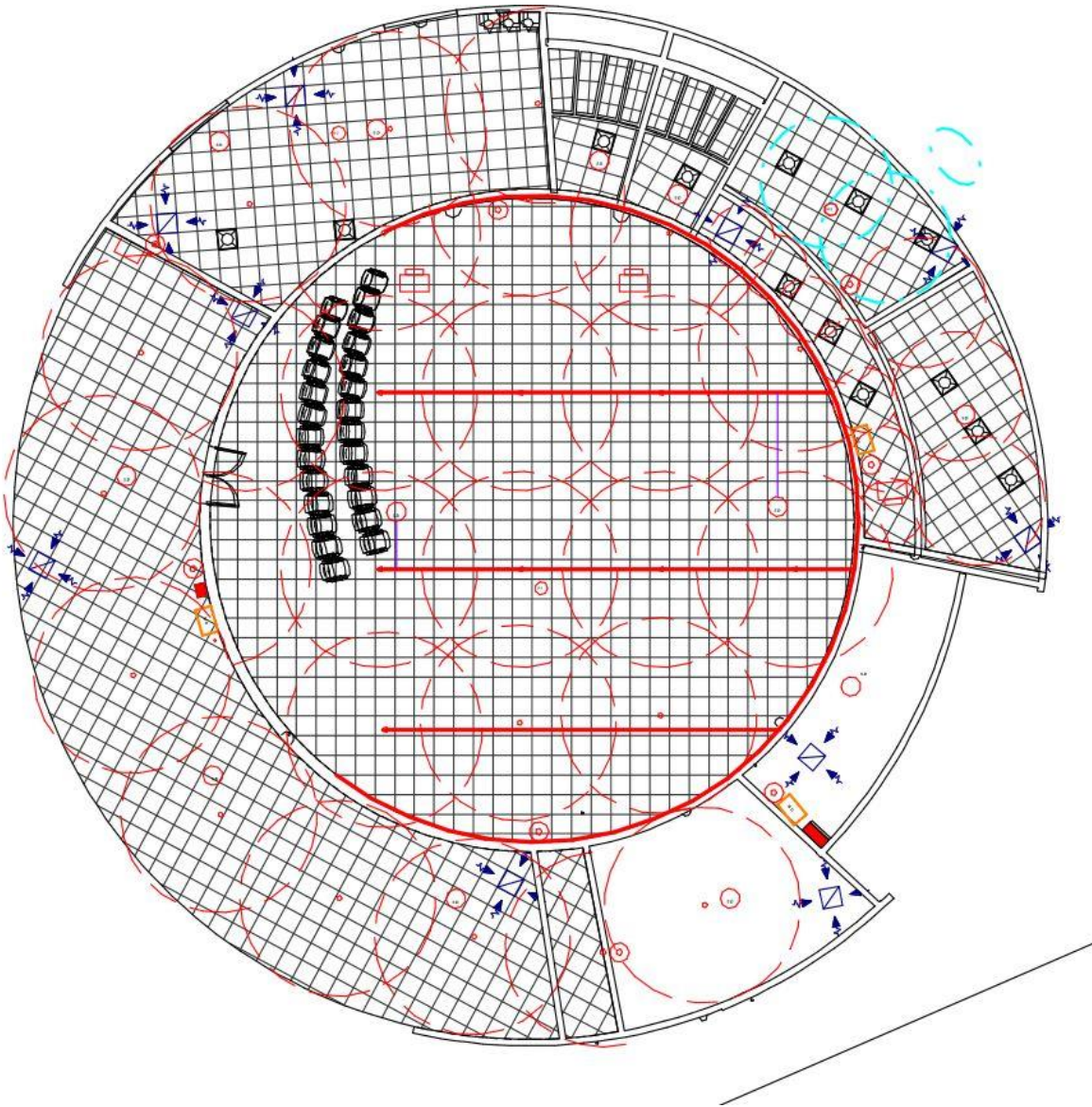


Figure 62- fire fighting system connection

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